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Integration of Technology Within Intervention Strategies for Students With High Functioning Autism: A Phenomenological Approach to Analyzing Educators' Viewpoints

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Abstract

There is a phenomenon that exists within the Maryland State Public School System regarding technology integration within intervention strategies for students with high functioning autism (HFA). Educators have attested that there is minimally available technology for consistent use when working with their students during intervention strategies and services. Thus, when stakeholders understand the actual experiences of the professionals that work with students that have HFA on a daily basis, positive reform may occur at the immediate level by administrators within school buildings. The purpose of this study was to examine how general and special educators experienced technology use during interventions that they provided to their students with HFA. There were two main research questions: How do general and special educators describe their experiences using technology during interventions for students with HFA? What factors are IEP team committee members considering when they decide to include or refrain from adding technology accommodations within an IEP for students with HFA? The instrumentation utilized in this study was a set of open-ended questions conducted in an interview format. After careful analysis of the data collected, six main themes were detected connected to the conceptual framework of educational equity, persuasive technology, and theory of mind. The necessity of serious funding reform for technology within this particular county are the implications for future practices in the Maryland State public school system. Provision of technology including electronic devices, adequate professional development, and increased funding will equalize educational access for disabled students with HFA.

Keywords: high functioning autism (HFA), individualized education program (IEP), technology, educators, integration, interventions

Dedication

For Michael, Hunter, Mom, and Dad

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I would like to thank Dr. Chad Becker for sticking with me through all my travesties, trials, and tribulations. He was encouraging, thorough, and knowledgeable. Dr. Becker has a dedication to his work and his students, and had it not been for him, I would not have finished this dissertation. Dr. Marilyn Lewis was a patient member of the committee that also put forth the effort with her expertise. Dr. Brianna Parsons was an encouraging member of the committee. Even though we only had a short time together, I admire her work ethic and wonderful positive sunny attitude.

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Chapter 1: Introduction

Introduction to the Problem

Currently, more than 3.5 million Americans in the United States are living with autism (Autism Society, 2019). These numbers are astonishing and advocates for the disabled demand that the public education sector address the needs of these diverse learners; "we need to better understand not only who has autism, but whether they are receiving the support they need and how we can ensure that they do receive it" (Rosanoff, 2015, p. 1). The Center for Disease Control calculates that one in 68 people in the United States has been diagnosed with autism as of 2019 (Center for Disease Control, 2019). Autism is a developmental disorder listed in the Diagnostic and Statistical Manual (DSM). High functioning autism (HFA) is not listed in the DSM-5; however, it is a sub-category used by some professionals to categorize individuals with autism who have an IQ of 80 or above and can function within the norms of society or a classroom with some accommodations (Autism-help.org, 2019).

Previous researchers have conducted quantitative studies and found that people with Autism Spectrum Disorders (ASDs) had an affinity and preference for technology usage (Finkenauer, Pollman, Begeer, & Kerkhof, 2012). Accordingly, technology was thought to be beneficial for students with HFA. For the purposes of this study, the term "technology" is used to describe electronic devices such as Chromebooks, computers, iPads, and Smart Boards (Lachapelle, Cunningham, & Oh, 2018). Assistive technology refers to any item necessary to maintain or improve functional capabilities, from wheelchairs to technological programs, including speech-to-text programs or other high-tech software (Bodine, 2003).

In this study, I aimed to understand how educators used technology and technological aids during evidence-based interventions for their students with high functioning autism (HFA),

the informal term used to describe individuals on the broad-spectrum scale of autism. The term "autism" encompasses a wide range of deviations. from classic autism to the degree of autism certain individuals have been diagnosed with (CDC, 2019). Individuals with HFA, are generally proficient in vocabulary skills and can function alongside nondisabled peers in society (Autismspeaks.org, 2019). However, they still display an inability to fluidly interact socially with other nondisabled people (Kandalaft, Didehbani, Krawczyk, Allen, & Chapman, 2013). This was one reason people with HFA prefer electronic communication and digital learning platforms (Stichter, Laffey, Galyen, & Herzog, 2014).

In the early 2000's, legislation was created and enacted in order to combat the increased gap between disabled and nondisabled students. Two specific acts were designed by lawmakers to address the individualized needs of disabled learners. In January 2002, the first act, No Child Left Behind (NCLB), required that all students be proficient in reading and mathematics by the year 2014 (Abbott, 2010). Public education students would achieve these goals with improvements in instruction and curriculum, since highly qualified teachers taught students using scientifically based instructional practices or evidence-based practices (Abbott, 2010). The second act originated as the Rehabilitation Act, then changed to the Individuals with Disabilities Education Improvement Act (IDEA). The purpose of IDEA was to ensure that individuals with disabilities were protected and guaranteed equal access to education (Westlove, 2012). The act included six components: the Individualized Education Program (IEP), Free and Appropriate Public Education (FAPE), least restrictive environment (LRE), appropriate evaluation, parent and teacher participation, and procedural safeguards (Center for Public Education, 2019).

In December 2015, Congress passed the Every Student Succeeds Act (ESSA), an updated version of NCLB. With ESSA, the federal government granted eminent power to the states. Each

state dictated how they evaluated teachers, mandated standardized tests, and the type of required curriculum for school districts (Klein, 2015).

With at least 3.5 million Americans diagnosed with a form of autism, public education reform was a necessary action. Since there has been a paradigm shift in education towards digital formats, educators would need to explore the possibility of including consistent daily use of technology in the curriculum for students with HFA (Dykman & Davis, 2008).

Consequently, school administrators and educators addressed the increased academic needs of diverse and disabled learners with HFA. The educators decided that electronic digital platforms and the incorporation of technology was required for students with HFA to access the full curriculum (McLaughlin, 2010). Curriculum frameworks consisted of written standards or descriptions of what was taught in specific subjects in certain grade levels. Therefore, when students with disabilities had the opportunity to learn the same curriculum as their nondisabled peers and made progress, they accessed the general curriculum (Federation for Children with Special Needs, 2019).

Educators wanted to incorporate technology as an accommodation for increased access to the full curriculum. They conjectured that students with HFA would make greater connections within the lesson content when they used technology more often. For example, when a student saw a picture of the vocabulary word and an animation, they would form a clearer connection.

Accordingly, when technology or assistive software technology was unavailable, educators felt their students were disadvantaged in comparison to their nondisabled peers because individuals with HFA possessed an affinity and preference for technology which increased their engagement (Kleinert, Jones, Sheppard-Jones, Harp, & Harrison, 2012).

Educational equity is a term used to describe the equality of academic access for all students regardless of race, gender, or disabilities. Essentially, IDEA was designed to equalize education. Thus, the rate of disabled students with HFA continuing their academic endeavors would increase.

Recently, demographic information provided by the participants in a study indicated that those who identified as having some type of ASD reported fewer years of education than those who did not (Gillespie-Lynch, Kapp, Shane-Simpson, Smith, & Hutman, 2014). Therefore, in accompaniment to IDEA, lawmakers designed the Higher Education Opportunity Act (HEOA) to embolden students with disabilities to continue their education. The HEOA equalized academic access so that students with disabilities such as HFA received the same educational opportunities as their nondisabled peers in elementary, middle, and high school (Kleinert et al., 2012).

Students with some type of ASD, including HFA, comprised only 0.7 to 1.9% of the 2017 college population with an 80% withdrawal rate (George Washington Graduate School of Education and Human Development, 2017). Therefore, in order to increase the number of students with a type of ASD, such as HFA, who would continue to secondary and post-secondary education, I felt that it was important to understand the experiences of educators who utilized technology and technological aids within evidence-based intervention practices. The foundational aspect of academia is established in the elementary school years. Hence, it was critical for students with HFA to be taught intervention strategies during instructional practices.

In the least restrictive environment (LRE), general and special educators provide the basis of instruction for students with ASD (U.S. Department of Education, 2019). Therefore, in this study, I included the educators' detailed accounts of the reasons they incorporated or omitted

technology or assistive technology. I aimed to provide school administrators and future researchers with a basis of information for possible future reform.

Background, Context, History, and Conceptual Framework for the Problem

Although previous researchers, such as Cheng and Huang (2015), benefitted from existing studies and theories when they developed their conceptual framework, the frameworks were also unique to their study. Essentially, the frameworks were a system of concepts, assumptions, expectations, and beliefs that supported their research along the way (Ravitch & Raggan, 2011). The conceptual framework in this study was based upon theories of educational equity, theory of mind, and persuasive technology. My framework was specific to this study because I used the existing theories and analyzed how educators experienced technology or the reasons they omitted technology or assistive technology when they provided intervention strategies to students with HFA.

Drawing upon previous studies when they deliver intervention strategies to students with HFA, researchers explored treatments in a clinical setting that involved technology or assistive technology (Rajendran, 2013). Due to successful conclusive results, researchers have proposed that technology should be embedded within the public school educational curriculum because the use of technology and assistive technology would be beneficial to students with HFA (Odom et al., 2015). Therefore, the use of multiple formats of technology and assistive technology is recommended when educators deliver interventions to such students (Walker, 2017). Technological formats included, but were not limited to, all types of virtual reality (VR), computer assistive technology (CAT), online apps, software programs, video clips, and online gaming (Den Brok & Sterkenburg, 2015).

An educational intervention is a program or set of steps that educators use to assist them in improving student performance in an academic area of need. Instructional interventions are research or evidence-based so that an educator can track academic progress (Lee, 2019). An intervention is not an electronic device, but an electronic device can be used during an intervention to provide a student with a specialized software program for improvement (Federation for Children with Special Needs, 2019).

Educators in this study used interventions in whole-group and small-group instruction by providing pre-written notes, index card reminders, specialized resource binders, spiraled instructions, and technology (U.S. Department of Education, 2019). The available technology mostly consisted of iPads, Chromebooks, and desktop computers. The assistive technology was any type of electronic device, format, or application that educators used to deliver evidence-based intervention strategies (Ploog, Scharf, Nelson, & Brooks, 2013). For example, an educator might have used the recording device on the Chromebook to document lessons so the student could play them back as needed (Walker, 2017).

American citizens have seen a shift in the delivery of education over the last 10 years (Walker, 2017). Unfortunately, there has been a demand, but not a budget, for highly qualified staff in the public school system (Stichter et al., 2014). The proposed alternative was electronic distance education that included additional digital formats, such as CATs, and virtual reality programs (Lahiri, Bekele, Dohrmann, Warren, & Sarkar, 2015). Lahiri et al. also claimed that the use of CATs increased the provision of equitable academic treatment. They also deemed virtual reality formats (VR) as highly successful in treating individuals with HFA. Unfortunately, VR has rarely been used in a public school setting due to the high cost of the equipment (Ploog et al., 2013).

Previous researchers, such as Schohl et al. (2014), stated that since assistive software programs were electronic and available on numerous devices, individuals were more likely to have practiced targeted skills at home as well as in school. Individuals who practiced skills utilizing technology increased their social competence (Strickland, Coles, & Southern, 2013). Additionally, individuals with HFA applied technological skills that increased their ability to plan, problem-solve, gain social competence, and communicate more clearly (Parsons & Cobb, 2011).

Consequently, I first needed to understand how educators used and experienced technology and technological aids during instructional intervention sessions for students with HFA. The educators' interviews, which consisted of their practical reasons for using technology and assistive technology, provided the basis of information for the study. They also described reasons for choosing to omit specific technology in a student's IEP as accommodations.

Statement of the Problem

Within the public-school sector, minimally available technology was integrated into instructional intervention strategies for elementary students with HFA (Walker, 2017). In the state of Maryland, both general and special educators were part of the IEP team committee and equally responsible for providing accommodations and meeting the service-learning hours of students with HFA (Maryland Online IEP, 2019). Therefore, since both special and general educators spent the most time with the disabled students, I believed they would have a multi-faceted perspective on the use of minimally available technology within evidence-based intervention strategies for their students with HFA. Thus, there was a critical need for researchers, public school administrators, school officials, and stakeholders to understand the experiences and opinions of general and special educators regarding their incorporation of

technology or the IEP team's reasons for exclusing specific technology within intervention strategies in their IEP for students with HFA in the public school system (Walker, 2017).

The educators' voices represented the population of special needs students for individuals with HFA. In the United States, we have a societal responsibility to care for and provide educational equity to all public school students regardless of race, gender, ethnicity, or disability (Valenzuela, Copeland, & Qi, 2006). Therefore, educators were adamant that they aimed to provide equal academic opportunities to their students with HFA.

Purpose of the Study

The purpose of this study was to interview general and special educators who worked with students with HFA. I was able to thoroughly comprehend how the educators experienced the integration of the available technology within intervention strategies by listening to them recount their detailed narratives. The educators also expressed their professional opinions regarding their use of the minimally available technology or why they chose to exclude technology from certain instructional practices.

For this study, I classified technology as any type of process created by complex systems using valuable resources that included, but were not limited to, the internet, computers, and other similar electronic devices, designed to make a person's life easier (Lachapelle et al., 2018). The term "assistive technology" was also used in this study to describe any item used to maintain or improve functional capabilities that included wheelchairs, screen reader devices, specifically designed software programs for a particular group of people, and pencil grips, highlighters, and large-read print (Bodine, 2003). Both technology and assistive technology were used during intervention implementation for students with HFA.

As technology was minimally available for integration within intervention strategies for students with HFA, most evidence-based practices were non-technology-based. As a result, there was a secondary issue concerning educational equity. Without consistently available technology for use, some students with HFA experienced educational inequality if they were not able to access the full curriculum in public schools (Best & Winslow, 2015). Diverse learners with HFA experienced disparities among educational opportunities, which equated to educational inequity (Kleinert et al., 2012).

Through state funding sources, each school was provided with Chromebooks, iPads, smartboards, projectors, visualizers, and desktop computers. Moreover, each educator and administrator were assigned a laptop. Educators reported that when technology was damaged or broken, the devices were not readily replaced. Thus, this study was important because the experiences and professional opinions of general and special educators detailed how they utilized the available technology and technological aids during intervention practices for students with HFA. I then examined the secondary issue of achieving educational equity (Best & Winslow, 2015).

Students with HFA should use technology and access the curriculum through multiple means, such as an electronic device that reads to the student with accompanying videos or pictures (Walker, 2017). Therefore, analysis of how educators experienced technology in classroom with students with HFA was important in determining the individual needs of the diverse learners with HFA (Best & Winslow, 2015). Since there has been a paradigm shift towards electronic platforms in delivering quality education, school administrators need to incorporate electronic education formats and integrate technology within the curriculum (Dykman & Davis, 2008). As of 2014, students with HFA may have been underserved due to an

absence or reduced availability of technology or technological aids incorporated within intervention strategies in the public school system (Stichter et al., 2014). However, the students that qualified for an IEP still received their non-technology-based accommodations. Many educators incorporated technology or technological aids within those evidence-based practices, when the technology was available, to increase educational equity.

By interviewing general educators who provided IEP students with the LRE and special educators who worked closely with students with HFA, I could understand the actual experience of educators who utilized technology and electronic devices during intervention strategies. The interviews and observations provided me with a multi-faceted analysis of the educators' perspectives. Thus, understanding how educators utilized and experienced technology and technological aids incorporated within intervention strategies may provide vital information for future researchers when developing technological aids or modifying the curriculum, because previous researchers, such as Irish (2013), emphasized the importance of modifying the curriculum to meet the needs of students with HFA.

Research Questions

In order to address the minimally available technology and technological aids available for technology integration within interventions for students with HFA and technology accommodations in their IEP, I structured my study around the following research questions:

- How do general and special educators describe their experiences using technology during interventions for students with HFA?
- What factors are IEP team committee members considering when they decide to include or refrain from adding technology accommodations within an IEP for students with HFA?

Rationale, Relevance, and Significance of the Study

The results of this study may assist administrators, educators, software designers, clinicians, or future researchers in developing strategic intervention plans for inclusion of technology and assistive technology programs for use with students with HFA. This study was unique because I closely examined the personal experiences and professional opinions of general and special educators when incorporating or excluding available technologies, such as Chromebooks that read a passage to a student or specific websites, within intervention practices. The educators' perspectives were vital because they produced a detailed narrative regarding how technology was utilized and integrated within, or excluded from, intervention strategies.

Previous studies were designed and conducted in clinical settings (Ke & Im, 2013). The researchers included the use of technologies and assistive technologies such as VR formats, CATs, and other software programs and applications (Cheng, & Ye, 2009). White, Smith, and Scherf (2014) examined the benefits and promising future of serious game design for individuals with ASDs.

Several researchers focused on generalization of knowledge transfer and suggested embedding it within instructional interventions for such individuals. Rajendran et al. (2011) conducted a study utilizing a virtual errands task to target specific skills for individuals with HFA. Evidence collected by the researchers showed the individual's inability to deviate from a listed order of tasks and capability to multitask. The study was a starting point for future research in this area and how software could be designed to improve interventions for people with HFA (Rajendran et al., 2011). Kandalaft et al. (2013) designed an evidence-based social intervention that addressed social awkwardness in individuals with HFA. After attending sessions, participants provided feedback to the researchers that indicated they felt the intervention was

successful (Kandalaft et al., 2013). Other researchers, such as Gillespie-Lynch et al. (2014) and Herrera et al. (2008), also concluded that there were positive results from research studies regarding use of technologies during intervention strategies for individuals with HFA (Gillespie-Lynch et al., 2014). However, those studies took place in a clinical setting, with few participants (Herrera et al., 2008).

The special and general educators' viewpoints addressed how they used technology during intervention services for students with HFA. In order to configure an educational plan and design the appropriate curriculum for such students (Best & Winslow, 2015), it was necessary to analyze the educators' viewpoints regarding technology usage in intervention strategies. This study included professionals that interacted with students daily and were able to articulate important information concerning their experiences while integrating or omitting the available technology.

Definition of Terms

The following terms are apposite to this qualitative study and are necessary in envisioning the entire purpose and relevance of this study to U.S. society.

Accessing the full curriculum. A curriculum is a written set of standards or descriptions for specific subjects and grade levels. Students involved in making progress within the standards are said to have accessed the full curriculum (Walker, 2017). Adjustments can be made to the learning format and method of content delivery to completely access the curriculum (Federation for Children with Special Needs, 2019).

Accommodation. This is also referred to as evidence-based practices. Accommodations alter the way a student learns the material by providing other means to accomplish the task (Understood Team, 2019). Accommodations may include technological devices or software

programs, such as a speech to text program to assist disabled students when writing, as well as visual supports that include graphic organizers, vocabulary picture cards, or video clips that demonstrate how to solve certain math equations (National Professional Development Center on Autism Spectrum Disorders, 2019).

Assistive technology. Any type of electronic device, software program, online game, or digital application (Ploog et al., 2013). Any item used to maintain or improve functional capabilities including, but not limited to, walkers, wheelchairs, pencil grips, alarm-signaling devices, screen readers, large dialers on telephones, and controls that open and close doors. Assistive technology is designed and used to enhance the quality of an individual's life (Bodine, 2003).

Antecedent-based intervention (ABI). Antecedent-based interventions can be used to decrease an identified interfering behavior and increase engagement by modifying the environment (National Professional Development Center on Autism Spectrum Disorders, 2019).

Autism. This is categorized as a developmental disorder that affects a person's ability to socialize and comprehend others' feelings. Autism does not negatively impact intellectual ability or IQ (Cheng, Huang, & Yang, 2015).

Autism spectrum disorders. ASDs are disorders that fall under the autism category but have differing aspects as to the severity of impact on an individual (Grynszpan et al., 2011).

Computer assistive technology (CAT). Computer assistive technology is considered as any type of electronic device used to aid an individual in visualizing, understanding, or learning additional information about a topic (Ploog et al., 2013).

Causal inference. The prediction of what occurs due to a specific cause (Moustakas 1994).

Cognitive behavioral intervention (CBI). Cognitive behavioral intervention teaches learners to examine their own thoughts and emotions, recognize when negative thoughts and emotions are escalating in intensity, and use strategies to change their thinking and behavior (National Professional Development Center on Autism Spectrum Disorder, 2019).

Discrete trial training (DTT). Discrete trial training consists of an adult using adult-directed, massed-trial instruction, reinforcers, and clear contingencies and repetition to teach a new skill or behavior (National Professional Development Center on Autism Spectrum Disorders, 2019).

Educational equity. This concept involves equal educational opportunities and achievements for all students regardless of race, religion, ethnicity, gender, socioeconomic standing, or disability (Best & Winslow, 2015).

Epistemology. This is a branch of philosophy that investigates the origin, nature, methods, and limits of human knowledge (Husserl & Dermot, 2012).

Functional communication training (FCT). FCT can be used to replace interfering behaviors with more appropriate and effective communicative behavior (National Professional Development Center on Autism Spectrum Disorders, 2019).

Hermeneutics. The science of interpretation (Husserl & Dermot, 2012).

Interventions. An instructional intervention is a specific program or set of steps to help a child improve in an area of need. Interventions are instructionally designed so that progress can be tracked to evaluate improvement. All interventions are either research-based or evidence-based and provided daily to students in need (Lee, 2019).

High functioning autism (HFA). HFA is an informal term that classifies individuals with autism as having an IQ higher than 80. Individuals can read, write, speak, and perform basic

life skills, such as eating and getting dressed, as well as function in a general education classroom with reasonable accommodations (Autismspeaks.org, 2019).

Individualized education program (IEP). An IEP is a federal document that details a specialized education plan for students with disabilities. Specific goals and objectives are set forth in this document that aim to close the educational gap between them and their nondisabled peers (U.S. Department of Education, 2019).

Least restrictive environment (LRE). This indicates that the student receiving IEP accommodations should remain in the general education classroom for the maximum number of hours possible (U.S. Department of Education, 2019).

Methodological assumption. In this assumption, the researcher looks closely at the process and language of research to develop an emerging design based on inductive logic. The researcher will cast aside generalizations and analyze the details that develop context (Creswell, 2013).

Modeling (MD). By using modeling, a learner with ASD can acquire and generalize new skills/behaviors (National Professional Development Center on Autism Spectrum Disorder, 2019).

Ontology. This is part of the metaphysics branch that studies the nature of existence or being (Karob-Karpowicz, 2016).

Peer-mediated instruction and intervention (PMII). With a foundation in behaviorism and social learning theory, PMII involves systematically teaching peers without disabilities ways of engaging learners with ASD in positive and meaningful social interactions (National Professional Development Center on Autism Spectrum Disorder, 2019).

Phenomenological approach. This is a qualitative research approach that aims to prove that a group of individuals experience a shared phenomenon. The data collected is based largely on interviews. Generally, the phenomenon is a type of societal or humanistic issue or problem (Creswell, 2013).

Persuasive technology. Any type of technology or assistive technology, such as online programs, software, electronic devices, that can modify a person's behavior or impact their learning capabilities (Odom et al., 2015).

Prompting (PP). Prompting is an effective practice to increase success and generalizability of target skills or behaviors for learners with ASD (National Professional Development Center on Autism Spectrum Disorder, 2019).

Qualitative research approach. This research utilizes a philosophical approach to addressing and understanding a humanistic problem that affects society as a whole (Creswell, 2013).

Reductionism. When a basis of knowledge is broken down into smaller units for a more specific idea (Husserl & Dermot, 2012).

Reinforcement (R+). Reinforcement (R+) is a foundational practice used with other evidence-based practices. It describes the relationship between learner behavior and a consequence that follows the behavior. This relationship is reinforced only if the consequence increases the likelihood that the learner will perform the skill or behavior in the future (National Professional Development Center on Autism Spectrum Disorder, 2019).

Response interruption and redirection (RIR). Response interruption and redirection can be used to eliminate or reduce interfering behaviors (National Professional Development Center on Autism spectrum Disorder, 2019)

Scripting (SC). Scripting is a visual or auditory cue that supports learners to initiate or sustain communication with others (National Professional Development Center on Autism Spectrum Disorder, 2019).

Self-management. Self-management teaches learners with ASD to discriminate between appropriate and inappropriate behavior, accurately monitor and record their own behaviors and reward themselves for appropriate behavior or use of skill (National Professional Development Center on Autism Spectrum disorder, 2019).

Social skills training (SST). SST refers to any adult-directed instruction in which social skills are targeted for improvement (National Professional Development Center on Autism Spectrum Disorder, 2019).

Technology. Processes created by complex systems using valuable resources that include, but are not limited to, the internet, computers, and other similar electronic devices, designed to make life easier (Lachapelle et al., 2018)

Technology-aided instruction and intervention (TAII). Technology-aided instruction and intervention refers to instruction or intervention in which technology is the central feature supporting the acquisition of a goal for the learner (National Professional Development Center on Autism Spectrum Disorder, 2019)

Theory of mind. The ability to empathize with others and understand what someone else is feeling and why (Rice, Fogel, & Shic, 2015)

Video modeling (VM). By using video modeling, a learner with ASD might be able to process information more easily and quickly (National Professional Development Center on Autism Spectrum Disorder, 2019).

Visual supports (VS). By using visual supports, a learner with ASD might be able to process information more easily and quickly (National Professional Development Center on Autism Spectrum Disorder, 2019).

Virtual reality (VR). VR is a type of assistive technology that includes different formats of the 3-D software program. Other forms of VR include immersive virtual reality, collaborative virtual reality, single-user virtual environments, and virtual environments. Individuals wear headsets with goggles to view scenarios in a 3-D format. Some virtual realities allow participants to interact with other avatars in real time (Schmidt, Gaylen, Laffey, Babiuch, & Schmidt, 2014).

Assumptions, Delimitations, and Limitations

Assumptions. Assumptions are plausible notions that researchers and other individuals accept as the truth. In most research design projects, assumptions are not discussed in great detail. Should an assumption parallel a limitation, the research claim is weakened or invalidated by the researcher (Eisner, 2017).

There were several assumptions in this research project. It was an unstated assumption that many educators were self-driven to provide the best possible instruction for students with HFA. Many educators spent countless hours having conferred with fellow colleagues and researched alternative instructional methods that enhanced their capabilities for best practices in the classroom.

Another assumption was that both special and general educators were willing to alter, change, or modify curriculum to suit the needs of students with HFA for maximized success. Most special and general educators also created or enhanced specific projects, tasks, or lessons, and sometimes even personally purchased materials or software for their students with HFA.

These modifications or enhancements for learning may not be included in the student's IEP, yet the educator practiced these strategies because they were best suited for their diverse learners.

Delimitations. Delimitations were used to narrow the scope of information and the most genuine results from the study's participants were produced (McLeod, 2008). Researchers predetermined certain parameters and strictly adhered to them during research procedures (Simon & Goes, 2013). These parameters were guidelines that eliminated extraneous and superfluous information that was irrelevant to the study.

Therefore, I was able to concentrate on unveiling important information regarding the phenomenon experienced by educators in the area by delimiting the study to a specific county in a particular region. By utilizing only one county, the evidence collected was easier to interpret and code. The educators in the same county had access to the same resources and worked with the same demographics of students with HFA.

Accordingly, the delimitations included socioeconomic standing, demographics, and regional location. By addressing each delimitation in depth, the results were verifiable and accurate. It was my job as the researcher to decrease external factors that may have invalidated collected evidence (Bound, 2011).

I was able to produce authentic data by delimiting the study to the specific socioeconomic status of the chosen school system. Technology resources were limited due to reduced funding and budget constraints. Additional funding in the form of Title I grants were supplied by the U.S. Department of Education (U.S. Department of Education, 2019). These grants provided eligible schools with extra money for additional resources such as staff, technology, and supplies. The two schools involved in this study were delimited to the same socioeconomic status and carried

the Title I moniker, having enrolled at least 40% of their students from low-income families (U.S. Department of Education, 2019).

The demographics were consistent in both schools, as the public school system had a 95.77% minority population of students, which included African Americans, Hispanics, American Indians, Asians, Native Americans, and two or more other races. The special education population accounted for 11.1% of the total enrolled or 14,355 out of 128,937 students.

Another delimitation was acquiring educators solely from Maryland. The study was conducted in one state, which eliminated the ambiguity of comparing educators from different states. Since Maryland was ranked fifth for high-quality education in the United States (Ziegler, 2017), it would have been inaccurate to compare the phenomenon to other states that may have been ranked higher or lower.

States had control over their budgets and allocated for public school funding (U.S. Department of Education, 2019). Therefore, the state and local governments were responsible for decisions on the dispersal of funds; Maryland presumed the responsibility of the budgets for K–12 education. Funds were then disseminated to all counties in the state and the district superintendents and school boards decided how the funds were divided amongst expenses (U.S. Department of Education, 2019). This was the primary reason this study was conducted in the same state and public school district for accurate coding of data.

Limitations. Limitations are non-controllable factors or flaws in the research design that may impact the study. However, precautions were taken to address the limitations in order to more accurately report data (Eberle, 2015). As the researcher, I carefully identified limitations

and utilized methods that increased the validity of the conclusive results (Ritchie & Lewis, 2013).

Typically, in qualitative studies, the participant sample size is minimalized as a characteristic of the phenomenological approach in which researchers are required to collect extensive details of the site as well as the individual (Creswell, 2013). Having applied the qualitative research approach, a researcher would purposely choose a small sample size to relay the most accurate information possible through rich description (Turner, 2010). Yet, it would also become a limitation when the sample size was too low, such as two participants, because the evidence collected from the qualitative study may not be validated by methods of triangulation, data saturation, redundancy, or member checking (Birt, Scott, Cavers, Campbell, & Walter, 2016).

Furthermore, time constraints may have been problematic and, thus, a limitation. The amount of information collected from participants regarding their experiences, opinions, thoughts, and emotions were imperative to this qualitative study. According to Stake (2010), researchers may have needed extra time to study the phenomena because it may have been a long and episodic journey. Comprehension of the entire issue may have been a lengthy investigation, especially concerning humans, who are complex beings. It may have taken educators the entire school year to fully comprehend the technology experiences shared during intervention strategies.

Chapter 1 Summary

The problem was that, in the two specific schools in this study, there was minimally available technology for use in intervention strategies. The technology strategies included assistive technology, such as programs, online gaming, video clips, and other forms of CAT

(Ploog et al., 2013), as well as specific electronic devices such as computers, iPads, and laptops. By exploring how educators utilized the resources, their professional opinions, and reasons for including or omitting certain technology, the study yielded important information for future modification of the curriculum and educational practices in the public school system in Maryland.

Educational inequity was the secondary issue that stemmed from the unequal dispersal of technology in schools across this county. Public school administrators, school officials, and educators had a duty to provide equal educational opportunities to all students regardless of disabilities (Valenzuela et al., 2006). Educators may have increased educational equity when they incorporated specific types of technology and technological aids within the curriculum and evidence-based intervention practices within the public school sector (Best & Winslow, 2015). In their effort to bridge the gap between students with disabilities and nondisabled students, they could have integrated specific types of assistive technology and electronic devices (Stokes, 2017).

The key attributes in the study were the various types of assistive technology, electronic devices, general educators, and special educators. The entire study was designed to decipher the educators' dimensional experiences and professional opinions while they used or omitted technology within intervention strategies for students with HFA. I felt this was the most sensible place to start the research, with the educators' explanations of utilization of technology and assistive technology or identification of the reasons for omitting technology from their instructional intervention practices.

Chapter 2: Literature Review

Introduction to the Literature Review

Society has begun to face a universally relevant humanistic issue. There has been a startling increase in the diagnosis of autism spectrum disorders. Statistically one out of 68 people in the United States (Center for Disease Control, 2019), one out of 250 people in India, and one out of 64 people in the United Kingdom have been diagnosed on the autism spectrum scale (Charron, 2017). Lifetime costs to treat this disorder exceed 3.2 million dollars (Lahiri et al., 2015). In fact, some venture as far to say that this has become a worldwide epidemic (Irish, 2013). Researchers have provided qualitative and quantitative statistical evidence indicating that further research is needed to develop efficient intervention strategies (Odom et al., 2015).

Thus, in this study, I addressed the educators' use of technology integration in intervention strategies for elementary-aged students with HFA. Over the years, as technology has continued to advance, electronic devices and assistive technological aids have become an efficacious means to administer intervention strategies in the private sector and in research facilities (Schmidt et al., 2014). Virtual reality and related software programs have been found to be beneficial in treating social skills deficits caused by ASDs and HFA as well as increased learning capacity (Gillespie-Lynch et al., 2014). However, virtual reality (VR) had only been tested in a clinical setting, not widely in the public school system.

Preference for technology. Consequently, individuals with ASD were found to have an affinity for computers and similar electronic devices (Finkenauer et al., 2012). Thus, researchers implied that the use of technology was successful in providing interventions that increased social competence. A facilitator measured the baseline social abilities of specific skillsets, then guided the participant through a series of techniques that taught them proper social skills, including eye

gaze, verbal clues, and nonverbal cues. These skills were mandatory for individuals to function in society (Strickland et al., 2013). Too often, people with HFA felt isolated and lonely, unable to appropriately interact with others in a social setting (Schohl et al., 2014).

Types of technology. In previous research, technological aids included, but were not limited to, online gaming, video clips, and VR-type programs. VR also included collaborative virtual learning environments (CVLE) and immersive virtual environments (IVE). The digital platforms were tailored to the individual's needs and depended on the targeted skillset (Parsons & Cobb, 2011). Closed forum virtual software programs appealed to individuals with ASD (Cheng et al., 2015) and were designed by researchers to provide safe, predictable environments in which an individual could continuously practice a specific social skill, such as eye gaze (Rajendran, 2013). Another available VR option was the unpredictable open forum where participants encountered life-like situations in real time. The software enabled them to choose how to proceed in specific social settings (Beach & Wendt, 2014). Both open and closed forums were an invaluable component of technological intervention strategies (Vasquez et al., 2015).

Autism. Additionally, this context section contains background information to support the problem statement. As the number of autism diagnoses continues to rise (Center for Disease Control, 2019), successful intervention strategies must be developed to counter the costs associated with ASD—an estimated 3.2 million dollars for incremental lifetime cost projections (Lahiri et al., 2015). Provision of equitable treatments has started with the availability of technology (Stokes, 2017), including VR for clinical purposes when intervention strategies are administered by trained staff (Stendal, Balandin, & Molka-Danielsen, 2011). With the ease of access to technological aids such as specific software programs on multiple devices, individuals continue to practice targeted skills at school and at home (Strickland et al., 2013), because the

reinforcement of learned skills is imperative to increased social competence (Goldsmith & LeBlanc, 2004). Researchers, clinicians, and educators have used technological aids such as VR formats for individuals with ASDs and HFA, which assist them in planning, problem solving, and increased social competence and provide a clearer means of communication (Parsons & Cobb, 2011). Therefore, it is critical to continue expanding the field of technology research, such as in VR, CVLE, and IVE, to develop effective and successful interventions, especially for the public school sector (Didehbani, Allen, Kandalaft, Krawczyk, & Chapman, 2016).

Autism is classified as a neurological disorder that impacts individuals' ability to learn appropriate social skills (Kennedy & Adolphs, 2014); these individuals have challenges with speech and nonverbal communication (Autismspeaks.org, 2017). Since one in 68 people in the United States have been diagnosed with autism spectrum disorders (Parsons & Carlew, 2016), there is an educational need for successful interventions to increase the social competence of individuals with HFA (Grynszpan et al., 2011). ASD has affected the lives of millions of individuals and the community at large, because appropriate social skills are necessary for interaction among people in society (Autismspeaks.org, 2019). The problem addressed in this study was the minimally available technology for integration within evidence-based intervention strategies for students diagnosed with HFA within the public school system. If successful interventions are not developed, individuals with HFA experience an increased risk of feeling disengaged from society, isolated, or alone (Schohl et al., 2014), which results in depression, stress, anxiety, low self-esteem, and rejection from peers (Schohl et al., 2014). Since most evidence-based interventions are delivered in the public school system as part of an individual's IEP, both general and special educators are responsible for providing intervention strategies (Maryland IEP Online, 2019).

Theories in literature review. The literature review has been organized into specific theories that include educational equity (Valenzuela et al., 2006), theory of mind (Kleinman, Marciano, & Ault, 2001), and persuasive technology (Odom et al., 2015). Various qualitative approaches have been used, such as mixed methods, phenomenology, case studies, and ethnography (Creswell, 2013). The cumulative data displayed a commonality among results, depicting a serious issue that has become a societal problem (Rosanoff, 2015). Researchers using descriptive statistics that provided evidence from a quantitative standpoint. I have provided a section below that includes specific relevant studies and literature review papers that offer insight into the methods and results.

The literature review was also organized according to the conceptual framework review of methodological literature, research findings, and critique of previous research. The researchers chose the framework that detailed the ToM and attended to the foundational problem (Schwartz et al., 2014). For individuals with ASD and the lack of understanding how others think and feel, researchers explored technological interventions such as single-user virtual environments (SVE) to create strategies to increase social competence (Irish, 2013). Another framework, persuasive technology (Odom et al., 2015), was the basis for the use of all technological aids. Researchers attempted to modify the behavior of individuals with ASD by having them interact with technology (Rice et al., 2015). The results were tracked, analyzed, and measured through statistical and qualitative data gathered by researchers after studies were conducted (Courgeon, 2011). Researchers utilized qualitative studies and produced rich descriptions of participants through field observations and interviews (Creswell, 2013). They utilized quantitative statistics and calculated the average of a large number of participants for a more generalized theory (Finkenauer et al., 2012). Both types of research approaches yielded success in most cases.

Cheng and Ye (2010) noted that the study they conducted increased the participants' abilities and improved their ToM after they utilized a CLVE-social interaction system.

As of 2019, there were no known schools in this specific Maryland public school system that utilized VR formats for treatments or intervention strategies for students with HFA. However, I decided to include the long and extensive background information on clinical trials to provide a foundation to consider the option in the future (Jeekratok, Chanchalor, & Murphy, 2014). These studies not only detail and prove the usefulness of VR, IVR, CLVR, and robotics, but the researchers also emphasize the use of technology and assistive technology in general and the multitude of benefits for people with HFA (Schmidt et al., 2014).

Conceptual Framework

In this conceptual framework, I have provided a directional means to interpret collected data from interviews and dialogues. The framework of educational equity, theory of mind, and persuasive technology were critical in assessing educators' experience while providing intervention strategies to students with HFA (Vasquez et al., 2015). Upon analysis of collected data, I used this framework to construct a viable argument regarding use of technology in the public school sector for students with HFA.

Educational equity. One component of the conceptual framework was based on the right of educational equity, the equal opportunity to learn regardless of disabilities (Valenzuela et al., 2006). The term "educational equity" has been used for all public school students from pre-K to 12^{th} grade, and while the notion is exemplary in theory, the reality is that students with mild to severe disabilities have not fully experienced educational equity (Valenzuela et al., 2006). Even though special education services and IEPs are designed to equalize access to free public education (U.S. Department of Education, 2019), the absence of new and innovative

technological aids have negatively impacted students, especially those with an affinity towards computers and electronic platforms of learning, namely individuals with HFA (Rajendran, 2013).

The limitation stems from the absence of available technology for integration within intervention strategies for disadvantaged learners rather than the lack of qualified educators or disinterest in serving the needs of all children (Stokes, 2017). Consequently, practical needs for intervention strategies have addressed the requirement of diverse learners with HFA. Interested technologists used research-based methods for the development of software programs specifically designed to improve social functioning in individuals with HFA (Didehbani et al., 2016).

Since ASD has characteristic traits and mannerisms (Gillespie-Lynch et al., 2014), researchers have formulated appropriate theories regarding the educational needs of people with HFA; they have discovered that practical application of technology-based intervention strategies is beneficial to people diagnosed with HFA (Moore, Cheng, McGrath, & Powell, 2005). Researchers such as Stichter et al. (2014), who used technology during intervention strategies, determined that technology use and technological aids increase educational equity due to the cost effectiveness of an intervention in an electronic format. Students with HFA in rural and disadvantaged schools would be able to participate more fully, as the need for highly trained personnel would decrease with available technology (Stichter et al., 2014).

Various researchers, such as Goldsmith and LeBlanc (2004), supported the notion for educational equity. They explored assistive tools, namely, electronic tactile and auditory prompting, video modeling, virtual reality, and robotics, as technological aids designed by researchers and technologists that provided an alternative means for equal access to the educational curriculum. Analysis of existing data was necessary to make a recommendation for

future research in technological intervention strategies, which included technology and assistive technology: gaming software, programs especially designed for individuals with HFA, VR, and video clips for modeling (Goldsmith & LeBlanc, 2004). Stichter et al. (2014), advocated for specialized electronic software programs called iSocial, as well as supporting educational equity. Their study yielded positive gains in increased social abilities and the ability of students with HFA to access the educational curriculum.

Walker (2017) also bespoke the case for educational equity, having cited the plight of rural schools without the budget for advancements in technology. Best and Winslow (2015) argued that educational equity was important for students with disabilities, especially HFA, to be able to utilize available technology as an IEP accommodation to bridge the learning gap between disabled students with HFA and their nondisabled peers.

Virtual tutor training was developed by researchers to deliver literacy instructional support. Mason, Jeon, Blair, and Glomb (2011) conducted a phenomenological study which explored the participants' experiences after using an electronic format that enhanced their instructional skills and was designed to increase educational equity. This phenomenological study was an important inclusion because my study delved into the experiences of educators while they utilized technology. The study conducted by Mason et al. (2011) demonstrated that there was support for educators that taught them how to most effectively implement an electronic format when they taught students with HFA.

Overall, the concept was important because effective literacy strategies were vital for individuals with HFA to access the general education curriculum (Stichter et al., 2014). Inclusion of evidence-based practices for students with ASDs and HFA is listed as an accommodation within an IEP. The evidence-based practices were either technology-based or nontechnology-

based. If the accommodation was nontechnology-based, educators could use other means to accomplish the practice, such as using a video clip to demonstrate Modeling (MD) or Visual Supports (VS), as long as they provided the accommodation as listed. If the accommodation was technology-based, the educator would have to provide the student with the technology (Maryland IEP Online, 2019). The educators decided the most effectual means and provided the accommodation to the student and the aids that assisted them.

Of students with disabilities, those with HFA have faced the greatest challenges (Didehbani et al., 2016). An educational gap has resulted because clinicians, doctors, and educators have an incomplete comprehension of this disorder and cannot fully articulate specific practices that would equalize education (Autismspeaks.org, 2019). Students with HFA are at a higher risk for the inability to fully comprehend certain language art skills, such as inferring and prediction, due to social disengagement (Schilbach, Eickhoff, Cieslik, Kuzmanovic, & Vogeley, 2012). Students with HFA tend to excel in rote skills and algorithmic mathematical problems. Low IQ is not known to be a factor with this disorder, as it is typically classified as a developmental delay (Rajendran, 2013).

Persuasive technology. Another component of the conceptual framework was based on the principles of persuasive technology (Odom et al., 2015). The researchers, Odom et al. (2015) described persuasive technology as, "any type of computing system, device, or application that was designed to change a person's attitudes or behavior in a predetermined way" (p. 3806). This led researchers to explore the use of technology as an intervention that helped people with HFA to increase their social engagement and alter predetermined behavior, such as emotionally shutting down, resulting in higher success in their educational endeavors (Didehbani et al., 2016).

Researchers have found that use of technology, particularly virtual environments, positively impacts the increase of social ability, attention spans, collaboration, and social eye gaze in a clinical setting (Grynszpan et al., 2011). In the clinical setting of this study, an individual's interactions were guided by a facilitator who taught students appropriate social skills. The virtual environment was deemed ideal because the electronic format caused individuals to experience a decrease in anxiety and stress (Didehbani, 2016). People with ASD were able to practice appropriate social skills in a safe place without fear of rejection or other repercussions (Irish, 2013).

For researchers such as Goldsmith and LeBlanc (2004) to effectively use persuasive technology in development of specific interventions, the physiology of the brain was analyzed for a deeper understanding of the complexities of social skill deficits in individuals with HFA (Pitskel et al., 2011). The frontal lobe is responsible for attentional control, inhibitory control, working memory, cognitive flexibility, reasoning, problem solving, and planning. The orbitofrontal cortex is primarily responsible for impulse control and socially appropriate behavior (Pitskel et al., 2011). The prefrontal cortex houses cognitive control and stimulus control, associated with operant and classical conditioning. These two processes compete for control of elicited behaviors. Inhibitory control represses repetitive behaviors by overriding stimulus-driven responses (Campbell, Reece, Taylor, & Simon, 2006).

These physiological aspects of the brain house the structures that are vital for the proper functioning of processes. When the frontal lobe is not fully developed or there is an absence of a specific hormone, all executive functions, especially social skill deficits, are negatively impacted (Pitskel et al., 2011). Therefore, in understanding the intricacies of the brain, researchers

developed appropriate assistive technologies and software programs that could be utilized in the public school setting for intervention strategies for students with HFA (Jeekratok et al., 2014).

Hence, it was critical for researchers to incorporate persuasive technology for the development of successful intervention strategies for educators to use when serving the educational needs of individuals with HFA (Odom et al., 2015). Researchers in 2017, such as Hochhauser and Grynszpan (2017), dictated that technological aids, including virtual reality interventions, increased peer-to-peer interactions. Several types of programs were available by which students were able to increase their academic success. Some virtual environments (VEs) tend to exist in a solitary format for single interactions among participants (Schmidt et al., 2014). Yufang, Huang, and Yang (2015) designed their 3-D module to include real-life social interactions that students encountered on a daily basis, such as boarding a school bus and interactions with the teacher in a classroom. Given specific scenarios, the participant must have made decisions that elicited an appropriate peer-to-peer or student-to-teacher interaction.

Researchers Yufang et al. (2015) concluded that the program was successful because individuals achieved a positive change in social skills behavior after using the 3-D system. Although this study was conducted in a clinical setting, the goal was to increase the ability to successfully interact within a school setting. The implications were that VE or VR can be beneficial if they are also provided within a public school setting (Yufang et al., 2015).

Additionally, some researchers noted that collaborative learning virtual environments (CLVEs) were effective components of persuasive technology (Odom et al., 2015). In that title, the word “collaborative” signifies that the participants discussed and compromised to complete assigned tasks. This necessary skill was imperative for students with HFA to learn in order to function appropriately in a public school setting (Walker, 2017). Another researcher, Rajendran

(2013), summarized the importance of referential communication. Conceptual problems were salient when individuals with HFA were required to collaborate. Researchers used CLVE; they designated a specific task where individuals made a joint decision, for example, which color block to use when building a tower together. This program targeted cognitive processing in individuals with HFA when they had to evaluate the wants and needs of others in a school setting (Moore et al., 2005).

Theory of mind. Kandalaft et al. (2013) explored the effects of utilizing technology to increase Theory of Mind (ToM) and successfully altered the ability of students to comprehend the thoughts, needs, and wants of others. When someone with ASD, including HFA, could make accurate inferences, that individual positively interacted with their peers on some level. Kandalaft et al. (2013) designed their study to evaluate the ability of students with ASD to access ToM when they interacted with their peers in the least restrictive environment in the classroom.

Rice et al. (2015) addressed the importance of ToM in their study, which utilized a program for students with ASD that measures the ability to read facial expressions by computer-assisted face-processing software. They concluded that participants who were able to increase their ToM were more comfortable working with their peers on tasks and other collaborative projects in class. An individual's ability to access their ToM was a key critical component of successful collaboration (Rice et al., 2015).

Inference, including how others felt, was a vital skill necessitating the incorporation of an individual's ToM in appropriate social reactions. Ploog et al. (2013) conducted a grounded theory study that addressed ToM as a component of their research. Since cooperative learning and receptive acceptance of another's point of view was essential for successful collaboration in

the classroom, ToM was a paramount topic to address during intervention skills (Hochhauser & Grynszpan, 2017).

ToM was a concept that researchers used to assist in bridging the gap between individuals with ASD and their nondisabled peers (Rice et al., 2015). Kleinman et al. (2001) discussed ToM in individuals with HFA. In the absence of ToM, individuals were unclear about the motivations and intention behind a person's actions. An individual's failure to engage in eye contact also made them unable to read deeper emotions. Without being able to accurately assess the mental state of others, socialization was a problem for individuals with HFA (Kleinman et al., 2001).

Students with HFA who had inappropriate responses or lack of socialization with peers, negatively impacted classroom performance and success; students were expected to collaborate with each other to solve given problems or complete assignments together (Valenzuela et al., 2006). Benson (1995) stated that ToM deficits impacted pragmatic reasoning, which includes sensitivity to the speaker and inference of emotions from spoken words and unspoken body language. ToM deficits negatively affected multiple facets of an individual's life inside and outside the classroom (Irish, 2013).

The conceptual framework was built upon various components: educational equity, persuasive technology, and theory of mind. Previous and present researchers indicated that multiple types of electronic interventions were promising for the future of individuals with ASD (Vasquez, 2015). With the fluidity of multiple educational platforms and a shift in instructional paradigms (Dykman & Davis, 2008), students with HFA were better served in the public school system and, therefore, less alienated within society. Learning how to integrate into society enabled and empowered people with HFA (Schohl et al., 2014).

Review of Research Literature and Methodological Literature

Researchers yielded positive results when they employed technology as an intervention students with HFA (Vasquez et al., 2015). The quantitative studies were primarily conducted in a clinical setting. Researchers who quantified the success of a technique that incorporated technology would have grounds to justify the future use of large-scale clinical trials (Parsons, Mitchell, & Leonard, 2004). The authors of published literature that appropriated a qualitative approach offered a different perspective regarding the usage of technology in intervention strategies (Rice et al., 2015). The main types of technologies tested consisted of multiple formats of VR programs. VR consisted of collaborative virtual reality environments (CVLE), immersive virtual environments (IVE), and single user general virtual reality (VR). Other technological aids studied included computer assistive technology (CAT) and online instruction (Den Brok & Sterkenburg, 2015).

Some technology-based research has been conducted in the public school system (Sankardas & Rajanahally, 2017). Since federal legislation mandated that all interventions were to be evidence-based or research-based, the IEP would have to contain accommodations supported by research-based results to succeed. Sankardas and Rajanahally (2017) performed a pilot study using iPads with voice interaction, a program called AVAZ, and found that it was successful for students with HFA. The voice system was designed so that individuals were more effective at communication within the classroom. Sankardas and Rajanahally (2017) concluded that the voice app was specific to a school setting and not easily transferrable to public social events or places outside.

Guldberg, Parsons, Porayska-Pomsta, and Keay-Bright (2017) closely examined technology researchers who worked directly with educators who designed and implemented

social stories assisting students with HFA in the classroom. Twenty-nine social stories were created and uploaded to 21 schools which examined the results and the perceived benefits of using the program. The researchers concluded that educators should be active participants in developing the stories as opposed to researchers and technologists, because the evidence they collected indicated that there was little to no knowledge transfer from the social stories created solely by the researchers (Guldberg et al., 2017).

Digital technology. In 2017, the expanding field of researchers evaluated the effectiveness of technology, which included VR. Reviewing how clinicians provided interventions to people with HFA (Stendal et al., 2011) allowed educators and administrators to analyze and improve processes and procedures (Walker, 2017). Schmidt et al. (2014) illustrated the effectiveness of utilizing a 3-D virtual learning environment with participants who had HFA. With their pod system, users felt immersed within a scenario specifically designed to increase social interaction and cooperative learning. Kandalaft et al. (2013) aimed their intervention at individuals with HFA. They tested virtual reality social cognition training in a clinical setting.

Researchers have conducted years of studies in which they depicted the benefits and limitations of the findings. In 2015, Cheng et al. used 3-D, IVE systems that enhanced social understanding and social skills for children with HFA. Grynszpan et al. (2011) explored a virtual environment paradigm for individuals with HFA that assisted them in decreasing attentional disengagement in a social context setting. Moore et al. (2005) conducted an empirical study regarding people with ASD and their ability to function in a collaborative virtual environment. Parsons, Mitchell, and Leonard (2004) used virtual learning environments for people with ASD and measured the potential benefits of computer-based tasks. In 2013, Ke and Im examined the

implementation and projected effects of virtual reality based social interaction programs for individuals with HFA.

As technologists continue to improve electronic devices and software programs, researchers have begun to collaborate with technologists and create educational intervention programs (Parsons & Cobb, 2011). The opportunity to have VR for use in classrooms is projected to become a viable option in the future. Researchers have tested specific software programs and electronic devices in a clinical setting and hypothesized how the results may be transferred for use in the classroom for students with HFA (Greffou et al., 2011).

Educators who provided effective interventions were imperative for increased educational equity (Best & Winslow, 2015). The Federal Department of Education set forth requirements for students who possessed an Individual Education Program (IEP) to spend most of their educational time in the least restrictive environment (LRE; U.S. Department of Education, 2019). The LRE was part of the No Child Left Behind Act and Americans With Disabilities Act (Klein, 2015). For most students with HFA, the LRE was the general education classroom (U.S. Department of Education, 2019). Often, special educators provided "push in" services, indicating that they offered support, while the student was immersed in the regular classroom with their peers.

For students with HFA, comprehension of how to appropriately interact, collaborate, and infer the perspectives of others was a vital part of accessing the full curriculum (Kleinman et al., 2001). Therefore, development of technological aids has been tested. The results from the tests have provided researchers, clinicians, and educators with baseline data for possible use in the public school setting (Ploog et al., 2013).

The availability of the internet, technological devices, and software options have enhanced the quality of the interventions (Rajendran et al., 2011). Socioeconomically disadvantaged individuals or those residing in rural areas should be able to access distance education (DE) and CAT (Dykman & Davis, 2008). Stichter et al. (2014) made a case for the support of rural schools because highly qualified teachers were scarce, and their salary was too high. The curriculum was developed by highly qualified professionals and educational equity was achieved when students accessed the lessons via the internet from anywhere in the world (Best & Winslow, 2015).

Technological aids. Use of technology and technological aids has been the topic of discussion, research, and is at the center of current interventions (Greffou et al., 2011). Researchers seemed to be particularly interested in VR formats, including VR, IVE, and CLVE (Parsons et al., 2005). Researchers used the digital platforms when they designed and developed programs that targeted the specific necessary social skillsets (Parsons & Cobb, 2011). Grynszpan et al. (2011) developed a study that increased the ability of individuals with HFA to decipher social conversations. The software they utilized contained eye-tracking technology and used a socially expressive virtual character. The avatars were a consistent feature within interventions. Ke and Im (2013) required their participants to navigate personal avatars through a series of events, such as a cafeteria and a birthday party, while they maintained acceptable communication and social conventions. Researchers demonstrated the commonality among qualitative and quantitative studies and the practical aspects of the interventions. The goal for increased social competence was accomplished by exposure to life-like scenarios and ordinary social situations (Cheng & Ye, 2010).

Virtual reality. Clinicians who administered virtual reality as a technological aid provided interventions that increased the development of symbolic play in children with HFA (Herrera et al., 2008). The play intervention was designed to target the "social/emotional development and cognitive development of play that influenced each other through a transactional process" (Herrara et al., 2008, p. 145). When given simple and practical play tools, inappropriate social behavior responses demonstrated the weakness of accessing non-directive play in children with ASD. "I am going to act as if" (Herrara et al., 2008, p. 146) assessed the pronounced differences between children with HFA and their nondisabled peers. This case study and intervention technique included a virtual supermarket, for literal and symbolic representation, and evoked unscripted imaginary play with others (Herrera et al., 2008).

There has been implicit research-based evidence revealing social motivation avoidance in people with ASD, in which this deficit gave individuals with HFA the tendency to exercise social phobia, resulting in avoidance of individuals displaying happy emotions (Kim et al., 2015). The tendency toward avoidance negatively impacted children with HFA (Kim et al., 2015). Thus, the evidence collected from Kim et al.'s study (2015) indicated that social skills needed continuous reinforcement. Continuous reinforcement was critical when researchers, clinicians, and educators delivered interventions to children with HFA, because these children increased their ability to learn to play and use their imagination with constant practice (Kim et al., 2015).

Social gaze, through verbal and nonverbal cues, was a pertinent component of social behavior (Wang, Laffey, Xing, Ma, & Stichter, 2016). Individuals with HFA did not have a deep understanding of an emotion, so researchers used VR that measured the ability of these individuals to better comprehend the intentionality behind social gaze (Parsons & Carlew, 2016). Rice et al. (2015) noted that emotional deficits were apparent when individuals with HFA were

required to discern more complex emotions and mental states. Researchers found that in a clinical setting, VR programs supported the learning of the target skill for appropriate interaction with others in certain heightened states of emotion (Schilbach et al., 2012).

Cheng et al. (2015) expounded that a "stress-free social environment significantly affected learning in people with ASD and stimulated learning motivation" (p. 233). This made VR representative of real-world social situations where participants repetitively practiced appropriate reactions without added stimuli (Cheng et al., 2015). This practice also incorporated the necessity for use in other typical societal settings, such as a restaurant, coffee shop, or café (Ke & Im, 2013). Use of personal avatars allowed participants repetitive practice of appropriate social behaviors. The avatars' mannerisms in a crowded and sparsely populated café displayed the thought processes of an individual with HFA in a "natural environment" (Parsons & Cobb, 2014). Then, Parsons and Cobb (2014) administered an appropriate intervention. People with HFA tended to ignore social rules by invasion of personal space (Kennedy & Adolphs, 2014). This was apparent in both crowded and non-crowded settings in the VR environment (Parsons & Cobb, 2014).

However, VR cannot be the sole means for communication or interaction. Adolescents with HFA were equally at risk for isolation due to social impairments (Schohl et al., 2014). Technology enabled users to interact through electronic formats for ease and enjoyment (Finknauer et al., 2012). However, researchers found that solely interacting with electronics further isolated people with ASDs as they were not accustomed to engaging in the conventional mode of socializing in a face-to-face setting (Irish, 2013).

Single-user virtual environments. Researchers considered the Theory of Mind (ToM) approach and investigated the psychological benefits of single-user virtual environments (SVE).

A trained facilitator guided the participants through the tasks to increase their social abilities (Ke & Im, 2013). SVEs were a part of CATs, designed by researchers that delivered high-quality curriculum through electronic formats. CAT was a more desirable format for administrators in comparison to traditional methods of delivery because intervention implementation was completed with higher fidelity, less variability, and greater precision (Ke & Im, 2013). Ploog et al. (2013), claimed that individuals with ASDs experienced successful remediation of deficits in expressive and receptive language with the consistent use of CATs. The two processes were imperative for social communication (Ploog et al., 2013).

Researchers such as Lahiri et al. (2015) found that SVE platforms were successful because participants with HFA felt more encouraged to practice increased articulate speech and response. They also experienced stimulated active engagement for social interactions. Lahiri et al. (2015) used a quantitative approach and explored the use of physiologically informed VR for improved conversation skills in people with ASD. This type of task performance program redirected participants to look at the eyes while engaged in a bidirectional conversation of expressive and receptive language. The statistical p value indicated that recipients progressed in specific conversational competency (Lahiri et al., 2015). Parsons and Cobb (2011) reported that case studies contained evidence that 67% of youth participants with HFA positively improved their awareness of social conventions after the use of VE programs. In fact, the participants were able to comment on social situations by exercising learned appropriate social behavior (Parsons & Cobb, 2011).

Online interventions. Adolescents that transitioned to adulthood often found themselves cast out of intervention resources. Approximately 50,000 individuals with HFA required additional social skills for entrance into higher education programs (Strickland et al., 2013). VR

and computer-generated programs have developed as an intervention strategy to deliver curriculum to individuals with HFA to advance their social skills, such as the improvement of plan creation and increased problem-solving skills (Schmidt et al., 2014).

Strickland et al. (2013) examined the value of administering an online intervention. Researchers understood that people with HFA thrived on predictability (Odom et al., 2015). Accordingly, researchers who developed the online program ensured that participants became more efficient in understanding the rituals of social interaction because the researchers included directions for continued correct posture, eye contact, and facial expressions (Strickland et al., 2013). Specifically, this program proved effective in teaching appropriate verbal responses to face-to-face questions. The VR practice session was especially helpful because participants were able to continue practicing until a personal comfort level was achieved (Strickland et al., 2013).

Collaborative virtual reality environments. Consequently, people who had good social skills interacted and worked well with others (Stichter et al., 2014). Collaborative VR programming was used as an assistive aid for individuals with HFA, which increased their ability to read and interpret subtle social nuances and cues (Schwartz, Dratsch, Vogeley, & Bente, 2014). Participants used 3-D technology, an electronic forum, which exposed them to social scenes paralleling the real world (Beach & Wendt, 2014).

Cheng et al. (2015) and Cheng and Ye (2009) designed an experiment and intervention where participants explored classrooms and outdoor settings. As they encountered virtual people, the participants perceived how to interact with others. Upon completion, researchers calculated statistical data that indicated the participants increased social appropriateness, decreased inappropriate language, improved understanding of social context, and achieved social reciprocity (Cheng & Ye, 2009). This finding was important because for people with HFA,

social context increased the concept of self-embodiment and appropriate placement in social situations. Since youth with HFA tended to focus on different or inappropriate details of visual displays, the researchers created a program for enhancement of re-direction when engaged in social activities and digital programs (Cheng et al., 2015).

Wang et al. (2016) created a program that included embodied presence and co-presence with others. As avatars were treated as people within the CLVE, participants were required to learn how to interact on a socially acceptable level. Facilitators recorded baseline data and proceeded to administer the task as an intervention strategy, guiding individuals to alter their behaviors. Success was presented through statistical data as well as informational feedback from parents and participants (Wang et al., 2016).

Researchers such as Courgeon (2011) and Schilbach et al. (2012) have analyzed the effectiveness of CLVE and VR programs for redirection and correction of social gaze (Courgeon, 2011). Some interventions required participants to employ social gaze when they were engaged in a conversation (Bekele et al., 2014). Schilbach et al. (2012) conducted an experiment using VR in which they explored the possible modularly effect of social gaze on mechanisms of action control. They were able to investigate the effect of social context when individuals with HFA were given nonverbal social gaze cues. The researchers found that individuals with HFA were unable to use social cues to generate reactions. The researchers then concluded that future interventions were needed so administrators could teach individuals how to adjust their actions in accordance to changes in a recipient's social behaviors (Schilbach et al., 2012).

Immersive virtual reality. Another facet of persuasive technology included Immersive Virtual Reality Environments (IVEs). The programs incorporated the immersive technology of

placing an individual within a virtual environment (Schmidt et al., 2014). Participants confirmed that IVEs were an effective intervention because the technology was realistic (Schmidt, Laffey, Galyen, Babiuch, & Wang, 2011). Researchers such as Beach and Wendt (2014) explored 3-D software programs in which participants felt they were transferred into a real-life situation and chose the next action (Beach & Wendt, 2014). Researchers found that the participants' experiences of the unscripted allocation of various real-life scenarios were a crucial component of successful intervention strategies. Unscripted scenarios would most closely represent societal realism in which individuals practiced their response to given situations. The participant's decisions determined the series of events that occurred during the trial (Beach & Wendt, 2014).

Beach and Wendt (2014) utilized a freedom design in which users simply experienced life, including mundane tasks such as walking down the street to the post office. They chose an ethnographic research design which exposed the social issue that individuals with HFA struggled when trying to exercise social rules. The goal was to increase their ability to appropriately interact with others in a social setting. Beach and Wendt discovered that the participants were interested in learning how to change their behaviors (Beach & Wendt, 2014).

Therefore, in Beach and Wendt's freedom design program (2014), the participants traipsed around the virtual environment, explored, and met new avatars that represented people. The researchers found that the VR setup was highly beneficial because it exposed the unpredictability aspect that people with HFA have difficulty adjusting to. When individuals explored in a task-free IVE, they could formulate appropriate reactions during daily encounters. Encounters with others created interactions that resulted in behavior changes (Beach & Wendt, 2014). Consequences of actions were immediately displayed to encourage self-correcting

behavior. One participant incessantly spoke about computers, which caused the recipient avatar to walk away. The reaction informed the participant that his behavior was too self-involved.

Therefore, in the next encounter, the participant was influenced to ask the other virtual person about their own interests. He learned valuable social skills that increased his social competence (Beach & Wendt, 2014). Since the virtual characters possessed realistic human qualities; the participants needed to decide how to respond when a character fell asleep or refused to continue a conversation. Since the participants practiced how to handle ambiguous situations, their ability to be more responsive and less rigid increased (Beach & Wendt, 2014), which produced more flexibility in their reactions. Beach and Wendt (2014) found that IVE was a successful intervention strategy.

Yet, definitive scripted scenes were also necessary and taught specific skills to the individual with HFA (Mangan, 2008). Immersive technology seemingly transported the participant into the program, and they became part of the scenario. Typical scenes incorporated streets, playgrounds, and school-related activities (Saiano et al., 2015). Evidence has shown that people with HFA were able to accurately identify emotions through facial expressions in others; however, they struggled with interpretation of intentions (Wallace et al., 2010). The researchers conducting the IVE program were able to provide immediate feedback for the correction of behaviors (Wang et al., 2015). There was evidence of inappropriate reactions when they responded to undesirable behaviors and failed to properly differentiate between socially acceptable and unacceptable actions (Hochhauser & Grynszpan, 2017), which demonstrated that people with HFA had difficulty comprehending tacitly implied behaviors of social norms.

Another facet of immersive virtual reality included a 3-D virtual program called iSocial. This program was developed using a Social Competence Intervention curriculum designed

specifically for students with HFA in underprivileged and rural schools (Stichter et al., 2014). iSocial increased educational equity as per the needs of underprivileged individuals. It was effective because the immersive aspect incorporated a collaboration method where participants planned a vacation that necessitated the use of adequate conversational skills and the ability to compromise. The study's researchers suggested that instructional strategies with a high dependence on social interaction among students and 3-D virtual realms resulted in student success. The transfer of knowledge acquisition to fluidity was apparent in the pilot study conducted by Stichter et al. (2014) when they presented iSocial to participants with HFA.

Limitations of digital technology. Subsequently, there were certain limitations when using technological aids that included VR formats. Rice et al. (2015) expressed disdain at the limited number of participants, "expanding the number of participants in general, and including preschool, secondary school, specialized educational settings would greatly enhance the generalizability of results to broader ASD populations" (Rice et al., 2015, p. 2184). A small sample size may have misrepresented the accuracy of the generalized population of people with HFA. Stichter et al. (2014) agreed, "first, although three separate and unique districts were represented in this study, a total N of 11 students creates limitations for statistical analysis, generalization of results and the potential for Type 1 error" (Stichter et al., 2014, p. 427). Kim et al. (2015) involved 19 participants in their case study and declared, "another limitation the sample size, which was modest" (Kim et al., 2015, p. 3898).

Furthermore, Schohl et al. (2014) would have preferred their future case studies to be more diverse; "there were some limitations to the present study. The sample included mostly males who were Caucasian. This lack of diversity in the sample causes the findings to be less generalizable to a larger, more diverse population" (Schohl et al., 2014, p. 543). According to the

Center for Disease Control (2019), ASD is more common among males than females. In fact, one in 42 people affected with ASD were males and one in 189 people affected with ASD were females (Center for Disease Control, 2019).

Another constraint was the expense of a study's administration for an extended time. Grants and funding were limited. Therefore, the researchers were unable to complete longitudinal follow up and the statistics regarding the continued success of learned skills could not be calculated (Zablotsky et al., 2015).

Another issue was the possibility of compulsive computer usage among people with ASD. Finkenauer et al. (2012) conducted a quantitative study that empirically linked compulsive computer use to people with autism. It was found that due to the repetitive traits in people with ASD, compulsive computer usage increased, and they engaged in online social media instead of face-to-face social encounters. Computer-mediated communication became preferential. Conversely, this isolated people with ASD (Gillespie-Lynch et al., 2014).

In critiquing this study, evidence that participants maintained social knowledge is inconclusive due to the absence of longitudinal follow-up studies (Kandalaft et al., 2012). Researchers claimed that their present study was beneficial for individuals with HFA, so future case studies would be built upon the initial results (Saiano et al., 2015). Wallace et al. (2010) extrapolated results that varied, "there were trends in the data for the control group to score slightly higher than the ASD group on measures of spatial presence and engagement" (Wallace et al., 2010, p. 210) and "there were no group differences on the ecological validity subscale of the ITC-SoPI" (Wallace et al., 2010, p. 210) that referenced the social embodiment of the avatar within the scenario. Most limitations for the studies involved small sample size, lack of follow-up studies, length of time, and transferability of skills to the real world (Tekin-Iftar, 2010).

Typically, a small sample size was required for qualitative studies (Bound, 2011) and a large sample size for quantitative studies (Cohen & Crabtree, 2006). However, the nature of the issue prevented a solidarity format of following research norms. It has been stated that, "if you have met one person with autism, you have met one person with autism" (Jeekratok et al., 2014, p. 34). Thus, it was near impossible to declare blanket statements (Jeekratok et al., 2014). Instead, a generalized theory was implemented with flexibility and adjustment for individual needs (Courgeon, 2011). In order to effectively address the provision of successful interventions to individuals with HFA, the educators were consulted for their expert opinions regarding which interventions were successful inside the classroom and within the realms of the public school system (Walker, 2017).

Benefits of digital technology use. Researchers presented empirical evidence and proved that there were definitive benefits of technology in the implementation of intervention strategies for people with HFA (Wang et al., 2015). The interventions included educational needs as well as social skills training. VR provided people with ASD with a safe, controlled, and anonymous environment in which they freely practiced specific skills (Mangan, 2008). Avatar and clinicians who provided positive reinforcement encouraged individuals to adjust and alter their behaviors to increase social competence (Nikopoulos & Nikopoulou-Smyrni, 2008).

Stendal et al. (2011) explored the usage of virtual worlds as an opportunity for people with lifelong disabilities, especially people with HFA. Allowing people with HFA to choose the community they were interested in, individuals with HFA felt more at ease when they joined in a social group that had members similar to themselves. The researchers claimed that individuals were more apt to participate in group social functions via the internet because they felt more in

control (Finkenauer et al., 2012). This was an important precursor of face-to-face socialism (Gillespie-Lynch et al., 2014).

Collaborative Virtual Environments (CVE) have been shown to markedly increase social abilities and understanding when used as an intervention strategy (Odom et al., 2015). Cheng and Ye (2009) conducted a pilot study involving the use of VR to improve social skills abilities in three youths with autism. The small group intervention study focused on employing the 3-D VR technique to exacerbate the retention of learned social skills. According to quantitative statistical data analysis, the researchers concluded that use of 3-D VR had improved the youths' abilities to engage in more social norms and situations. The targeted behaviors included appropriate eye contact mannerisms and the ability to listen to others (Cheng & Ye, 2009). The researchers calculated the data by performance scores preceding the administration of the intervention and post-intervention assessment scores (Cheng & Ye, 2009).

While some researchers have discovered flaws within an intervention program, they implemented change for an improvement in services (Schimdt et al., 2014). Wallace et al. (2010) noted that individuals with HFA lacked awareness of inappropriate social behavior exhibited by virtual characters. Participants were immersed in a scene in which a mischievous character found cigarettes on a school playground and decided to try them. The avatar also attempted to persuade others into resignation of free will and engagement in inappropriate and dangerous behavior.

Participants with HFA decided to engage with the character. After researchers established baseline data, they developed virtual realities that targeted weak skills and provided extensive support to modify future behavior (Wallace et al., 2010). Thus, when researchers used immersive reality technology, they provided benefits to the academic community according to the established baseline data (Moore et al., 2005) and produced results that future researchers

utilized in development and determination of which practices were most effective for administration of intervention strategies (Schmidt et al., 2011).

Previous researchers used feedback to conduct their future studies (Den Brok & Sterkenburg, 2015). Prensky (2012) preached that we are in a digital age where there has been a paradigm shift in the delivery of educational services. Researchers that have used that knowledge to design technologically aided interventions have significantly increased the number of people with ASD who have succeeded in gaining social skills competence (Grynszpan et al., 2011).

There has been a significant need for continued research in this area. As the cause of ASD remains unknown, predictions of an increase or decrease in the diagnoses is not possible (Zablotsky et al., 2015). Researchers must continue to concentrate on a pragmatic solution to develop successful interventions, because social challenges in daily living negatively impact individuals with HFA (Schohl et al., 2014). Therefore, it is important to continue the research for successful social skills interventions for individuals with autism because "the Centers for Disease Control reported that in 2008, one in 88 children were identified as having an ASD, and given the exponential increase in identification, consider ASDs an urgent and growing public health concern" (Stichter et al., 2014, p. 418).

However, seven years later, Parsons and Carlew (2016) reported that the numbers have changed. Instead, one in 68 people are now diagnosed in the United States with a form of autism (Center for Disease Control, 2019). Evidently, this has been a humanistic issue that has impacted society across the globe (Irish, 2013).

Provision of interventions began in the public school system at an early age (U.S. Department of Education, 2019). The constant problem has been the minimal availability of technology and assistive technology incorporated within interventions for students with HFA.

Both general and special educators were largely responsible for administering intervention strategies in the classroom (U.S. Department of Education, 2019); therefore, they had an informed opinion regarding their experiences with specific interventions. Therefore, the pertinent question was about the experience of the educators who delivered the technological interventions and their perception of the value of the interventions.

Review of Methodological Issues

Collection of data is paramount in support of a researcher's claim (Creswell, 2013). After identification of a problem and formulation of a research question, the researcher must decide the most effective and logical method to gather information (Bound, 2011). Quantifying data is a large component of evidence collection; however, there are other methods that must also accompany the process to dimensionally analyze and prove the claim. Researchers have investigated the benefits of using technology and technological aids as intervention strategies for people with HFA (Rajendran, 2013).

In my qualitative research study, I explored the experiences of educators who embarked on the educational endeavor of using technology and technological aids in evidence-based intervention strategies for students with HFA. My research focused on the integration of technology and technological aids in a public school setting and how the educators experienced the instructional use of technology in the classroom within intervention strategies for students with HFA.

Ethics. When developing a research study with participants, strict ethical rules must be adhered to. The researcher was required to obtain approval from specific boards and the participants as well as parental consent (APA, 2019). Parsons and Carlew (2016) developed and conducted a quantitative study that investigated bimodal virtual reality stroop for assessment of

distractor inhibition. As is clearly stated within their methods section, “upon agreement to participate, prospective participants were described the study’s procedure, risks and benefits, and alternative options (non-participation). Prior to participation, the participants signed written informed consent approved by the university’s institutional review board” (Parsons & Carlew, 2016, p. 1260). The statement indicated that the researchers’ complied with ethical standards for human subjects research.

Creswell (2013) depicted the importance of complying with the criteria of the American Anthropological Association. When live participants were used, individual data was compiled that formed a holistic scope of the entire issue rather than identification of each person. An overarching holistic theme was a more accurate representation of a specific population when researchers attempted to study and resolve a humanistic issue (Creswell, 2013).

Disproven hypotheses. Another research study assessed the utility of a virtual environment for enhancement of facial affect recognition in adolescents with autism. Bekele et al. (2014) discovered that their hypothesis was partially disproven. The researchers sought to prove that adolescents with HFA were unable to identify facial affect recognition, which resulted in the social awkwardness often experienced by individuals with HFA.

However, researchers proved that youth with ASD were able to correctly name static images of emotions as accurately as their nondisabled peers (Bekele et al., 2014). After calculation of the results, the researchers deduced the possibilities for these findings. While simple labeling of an emotion was not an issue, deep comprehension of the emotion and the appropriate response remained problematic for people with ASD. The researchers then discussed future alterations to the experiment to accurately assess the ability of youth with ASD to infer the meaning of someone else’s feelings and their reactions to another person’s emotions (Bekele et

al., 2014). A VR program was created and targeted inference skill and advanced social competence by individualizing the intervention in which participants were allowed to absorb social information and respond appropriately to a social situation (Bekele et al., 2014).

Limitations. Each study had certain limitations that the researcher or researchers encountered. It was the ethical responsibility of the researchers to disclose the limitations of their specific study (APA, 2019), which were addressed at the end of their literature review. They discussed in detail how the limitations impacted the results and recommended adherence to future precautions that decreased a set of limitations (Greffou et al., 2011). Since each study and researcher was unique, the limitations varied according to the expected outcome of the study.

***Null hypothesis limitations*.** When the null hypothesis was proven, the researcher discussed the limitations of the study and possible reasons for the unpredicted outcome. Schwartz et al. (2013) explored impression formation in youths with HFA and interpreted the role of nonverbal behavior and stereotypical activating information. The researchers disputed their own predictions and stated, "contrary to our hypothesis, HFA participants were as sensitive to nonverbal cues as controls. Moreover, HFA showed a tendency to evaluate persons more positively" (Schwartz et al., 2013, p. 1759). They further discussed the issue in latter sections of their paper that indicated both groups, control and HFA, were able to focus on relevant nonverbal stimuli while they watched animations. They adequately integrated information and formulated a cohesive and logical judgment.

Thus, when Schwartz et al. (2013) provided conclusive results that contradicted the hypothesis, the researchers offered extensive explanations. In this case, Schwartz et al. (2013) criticized the small sample size they used as an unrealistic representation of the entire population of individuals with HFA. Furthermore, the high IQ requirements may have influenced the

outcome as well. The actual set-up of the stereotyping material would need to be recreated to include priming techniques rather than simple target labeling of a person's expression (Schwartz et al., 2013).

Nonrealistic VR limitations. While developers of VR intended to produce the most realistic scenes, sometimes this was not achieved. Irish (2013) contended that researchers and technologists needed to collaborate in order to create an effective virtual situation that mimicked real-life scenarios. This would be a prudent move that would benefit users of VR interventions (Irish, 2013).

Absence of longitudinal follow-up study limitations. Another area of weakness was the absence of longitudinal studies that measured the long-term effectiveness of an intervention. There were numerous reasons for non-completion. The most common reason was due to fiscal restraints (Finkenauer et al., 2014). Studies were rarely revisited to quantify the retention of learned skills, largely due to the lack of funding.

Even though some researchers created a follow-up survey for participants in their research studies, the results were recorded only once as an extension of the study. Kandalaft et al. (2013) conducted a research study that explored the benefits of VR social cognition training for young adults with HFA. The intervention targeted the weaknesses of recognizing the ToM within individuals with autism. The participants had difficulty in identifying the thoughts and feelings of others; therefore, social cognition training was developed to increase their ability to successfully access ToM.

Six months after the conclusion of the experiment, researchers contacted the participants by phone to answer questions regarding the effectiveness of the intervention. Participants were able to express their opinions on their personal gains and offer improvement suggestions for

future studies. Their insight was considered for future development of case studies for maximum efficiency (Kandalaft et al., 2013). If the researchers were able to follow up after an elongated time such as a year or more, the study would provide more conclusive evidence that the intervention was successfully transferable (Kandalaft et al., 2013).

Limitation of small sample sizes. Some researchers conducted quantitative case studies. Gillespie-Lynch et al. (2014) surveyed 657 participants concerning their perceived benefits from computer-mediated communication. The study covered a spectrum of ages, from eight to 84 years old. The extensive number of participants, coupled with the variance in ages, produced a reliability factor of the *p* value, *z* value, and *r* value. However, with an online format, the integrity of the survey was compromised because caregivers, parents, siblings, or friends may have filled out the survey as the participant, which would not accurately depict how individuals with ASD and HFA truly felt about computer-mediated communication (Gillespie-Lynch et al., 2014).

Although many researchers conducted qualitative studies for a more in-depth analysis of the participants and their experiences, they frequently expressed the sample size as a limitation (Saiano et al., 2015). Due to the nature of the study, budget constraints, and ethical issues, studies using live participants often used less than 20 individuals. Kandalaft et al. (2013) conducted a case study that included eight young individuals with HFA. Participants in the Virtual Reality Social Cognition Training (VR-SCT) utilized the strengths of a VR platform and dynamic practice of meaningful social scenarios. In the discussion section, the researchers stated, "The small sample size and lack of control group limit the generalization of the study" (Kandalaft et al., 2013, p. 42).

Although it was difficult to ascertain a generalized theory from this case study, the results became a foundation for the researchers to build upon. Saiano et al. (2015) noted in the conclusion of their study that there was a small number of subjects. Thus, they needed to conduct the study with a larger number of participants that would have supported their successful conclusions.

Jeekratok et al. (2014) increased their sample size to 10 children. The researchers conducted a qualitative ethnographic study for more in-depth observations. The goal was to assess social skills after administration of web-based social stories and games. Children practiced displaying empathy towards others by sharing toys. The researchers aimed to conclude, with a bland generalization, that this type of technological aid provided successful social skills interventions. However, multiple trials with numerous participants of varying ages would have provided more data for concrete evidence (Jeeratok et al., 2014). In the limitations section, the researchers wrote,

> The small sample size (10 students) limits any attempts at generalization of the results. The study needed to work with a small number of participants because of the need for observation over a long period of time . . . Future studies with teams of researchers may be more suited to investigating studies of this type with larger groups of students. (Jeekratok et al., 2014, p. 45)

Increasing the sample size would necessitate more resources, incurring more expenses.

Rice et al. (2015) increased their sample size to 31. While 31 school-aged children did not completely represent the population, a larger sample size widened the scope. The FaceSay software measured the ability to read and understand facial expressions, emotions, and intentions. Due to the conclusive results, the researchers issued a blanket statement regarding the

capabilities of people with ASD and their inability to comprehend others' deep emotions (Rice et al., 2015). However, they point out, "expanding the number of participants in general, and including preschool, secondary school, and specialized educational settings would greatly enhance the generalizability of results to the broader ASD population" (Rice et al., 2015, p. 2184).

Time frame limitation. Another possibly problematic issue was the time frame. Experiments and interventions varied, and studies were conducted in days or months. Stichter et al. (2014) chose a longer period for their quantitative study. Eleven students participated in a 3-D VLE and engaged in a social competence intervention that lasted for four months and included 31 lessons. Even though the population sample size was low, the extended time allowed the researchers to deliver a more comprehensive social curriculum to the participants. The curriculum included 31 forty-five-minute lessons over five units. The researchers used statistics to calculate t values and determined that the participants improved their ability to interact socially with others. Parents were also included in the evaluation and reported that they believed their children had benefited from the intervention (Stichter et al., 2014).

Moore et al. (2005) believed in the power of education and were motivated to conduct a research study regarding the benefits of a CVE for people with ASD. They developed a software program that interacted with avatars over the span of four different stages and various phases within those stages for greater exposure to the intervention. However, this study was conducted singularly without additional sessions or prolonged engagement (Moore et al., 2005).

Conclusively, there were many similarities among studies of people with HFA conducted by researchers in the field of technology. Sample sizes were typically small, however, the configuration of all the data into a simultaneous chart displayed a continuity. The data was

evident that across the population, VR programs as intervention methods in a clinical setting were beneficial to people with HFA (Lahiri et al., 2015).

Each study differed slightly in the methodology, sample size, and general requirements; therefore researchers created a composite picture of the data across the experiments and produced a commonality that was generalized among the population of people with HFA. Inclusion of young adults, young children, adolescents, older adults, low IQ, high IQ, and average IQ encompassed a wider range that more accurately represented the entire population (Schwartz et al., 2014). Individual studies were not indicative of overall results; instead, the researchers compiled the results from all qualitative and quantitative studies, including the larger scope of people, which provided a proven generalization that technological aids, including VR programs, were successful when clinicians and researchers delivered social skills interventions to people with HFA (Den Brok & Sterkenburg, 2015).

Clinical setting limitation. Most of the studies were conducted outside an educational setting that incorporated the use of public school students. Herrera et al. (2008) conducted two phenomenological studies that involved the use of reality tools for development of symbolic play in children with ASD. Individuals with HFA experienced great difficulty acting appropriately in social settings; therefore, symbolic play was an essential foundational skill that preceded interaction amongst others.

The researchers chose two male participants, aged eight and 15 and studied the effects of technological intervention that encouraged symbolic play. Due to the small sample size, the researchers performed an in-depth analysis of the participants, their experiences, and the outcome. They included implications for use in the school setting and discussed them in the section discussing future work, in which, “the results suggest that VR is a useful tool in

educational intervention in children with ASD, at least in the two participants who were tested" (Herrera et al., 2008, p. 154).

Limitations were evident in specific environments when studies were conducted. Jeekratok et al. (2014) utilized a web-based design of social stories and games for children with HFA. However, while implementing the study, there was an unrealistic teacher-to-student ratio of one to one. The researchers claimed that the results were skewed due to close parental involvement and the one-on-one teacher involvement also impacted the outcome. However, the researchers still implied that the technology should be considered for school-based intervention strategies (Jeekratok et al., 2014).

Odom et al. (2015) performed an experiment using the CSESA technology framework in a school setting. Their intentions were to measure success in a school setting in order to inform future researchers and technology developers to assist individuals in the most relevant place, "the contexts in which students use the interventions in these studies build upon the Persuasive Technology concept. For the most part, the technology-based interventions in this review occurred in the contexts, times, and situations where they could be useful for students" (Odom et al., 2015, p. 3815).

Synthesis of Research Findings

As noted by various researchers, such as Lahiri et al. (2015), it is noted that autism is a complex neurological disorder categorized by myriad specific characteristics, including social and perception impairments, difficulties with verbal and nonverbal communication, presence of idiosyncratic isolated interests, and repetitive behaviors. Cheng and Ye (2009) also investigated the use of virtual reality and digital technology with individuals with autism and HFA. Since, the number of autism diagnoses have continued to increase each year (Center for Disease Control,

2019); Parsons and Carlew (2016) have also deemed this to be a pertinent clinical and public health issue. Individuals diagnosed with ASD have distinct deficits in social interaction skills and the impairment negatively impacted their ability to function in daily life among social norms and social convention expectations (Wang & Reid, 2009). The lack of understanding about subtle nuances of typical social situations (Beach & Wendt, 2014) placed these individuals at risk for being bullied, depressed, and experiencing anxiety (Schohl et al., 2014) and they resorted to atypical autistic coping characteristics such as rocking, body swaying, and repetitive movements (Greffou et al., 2012).

Use of technology. Therefore, researchers believed that successful interventions were critical to provide to individuals with autism and HFA (Schohl et al., 2014). The academic community, especially clinicians and researchers, have developed and conducted qualitative and quantitative studies and determined that technology and technological aids benefited individuals with HFA by increasing their social competence. Stendal et al. (2011) indicated that people around the world used the internet for a wide variety of tasks. In Norway alone, 85% of the population used the internet regularly (Stendal et al., 2011).

As digital technology developers continue to improve the quality, availability, and capability of electronic devices, the number of online and electronic users are projected to increase (Den Brok & Sterkenburg, 2015). Communication through social networking sites became an important way to meet people who shared common interests (Stendal et al., 2011). Gillespie-Lynch et al. (2014) described the internet as a "newly autism- compatible environment" (Gillespie-Lynch et al., 2014, p. 456) because computers functioned similarly to the processing style of people with autism. Even though people with HFA found online

interaction more desirable, they recognized that there were certain social conventions in the digital as well as the real world (Beach & Wendt, 2014).

Social skills training using technology. The use of technological aids in social skills interventions were proven to be cogent for increased social competence for most individuals with HFA. Ploog et al. (2013) explored the use of CAT for increased social appropriateness with positive outcomes. Use of video modeling, specifically short clips of correct social behavior, were found to increase socialism in four children who participated. After viewing the videos, children were permitted to interact with one another. There was an increase in collaborative interaction and a decrease in social isolation (Ploog et al., 2013). However, while researchers strived to prove that CAT was a successful intervention method, they validated that there was an absence of concrete data that proved CATs were more beneficial than traditional teaching and training methods (Ploog et al., 2013).

Theory of mind. Consequently, the ToM was a common theme among all the studies conducted to explore the possibility of technology providing successful social intervention strategies for individuals with HFA (Schwartz et al., 2013). This theory has been tested with conclusive evidence that children with HFA were unable to pass the self-belief test, which was relational to understanding what others think, feel, and believe (Irish, 2013). Therefore, interventions must be specifically designed to teach individuals with HFA how to make inferences or read emotions, thoughts, and intentions of others (Schwartz et al., 2014).

Ploog et al. (2013) researched the efficiency of using technology to teach individuals with ASD how to read the perspective of others. Of the two experimental studies, only one was successful in increasing the perspectives portion of social understanding. Yet, the researchers felt

this was still promising as an indication that CAT could be employed to achieve an increase in social competence (Ploog et al., 2013).

Rice et al. (2014) designed a study that addressed the mentalizing ability in individuals with HFA. Mentalizing is a component of ToM. Thus, to measure and address the abilities of individuals with HFA to mentalize another person's state of mind, the researchers created a study using computer-assisted face-processing programs. The study was conducted in an elementary school setting over a single 25-minute session conducted once a week for 10 weeks. Researchers found that the conclusive quantitative statistical evidence proved three out of five hypotheses that included the ability to mentalize more appropriately after the computer- assisted intervention was provided to individuals with HFA. Unfortunately, the individuals were unable to increase their positive interactions and decrease their negative interactions with non- disabled peers (Rice et al., 2014).

Use of virtual reality technology as interventions. Additionally, many researchers have explored the beneficial use of VR programs, including CVLEs and IVEs (Kim et al., 2015). Users of these software programs felt safer and more protected in a structured VR because it was a predictable environment (Wallace et al., 2010). Participants practiced social skills in a virtual environment without the fear of failing. These electronic interventions were accessed via a distance education program that delivered the Social Competence Intervention (SCI-A) curriculum, which consisted of five units with 31–45 lessons (Stichter et al., 2014). The researchers discovered that the technological format proved successful in areas of social responsiveness, social cognition, social communication, and social motivation (Stichter et al., 2014). However, in contrast to the results of Ploog et al. (2013), SCI- A statistical data did not display improvement in correctly reading other people's perspectives in social situations for

individuals with HFA. There was also a lack of statistical significance when they were required to recognize facial features and intentional expressions (Rice et al., 2015).

Researchers have argued that when users experienced immersive VR, they felt immersed in an environment in real time. Beach and Wendt (2014) developed a task-free immersive environment that paralleled the unpredictability of true daily living. The users created their own content for self-discovery. With facilitated guidance, participants made decisions when handling certain social situations. The researchers claimed that the program effectively prepared participants for interactions with real people in the real world; however, the transferability was not actually recorded (Beach & Wendt, 2014).

In conclusion, technological interventions were preferable to traditional interventions for several reasons (Whyte, Smyth, & Scherf, 2015). First, when nondisabled adults presented social skills in a structured setting to children with HFA, the dialogue and environment was too scripted, thus inhibiting the spontaneity of natural social behavior and leading to an artificial indication of natural adult-to-child or peer interactions (Ke & Im, 2013). Individuals with HFA must have learned how to blend into society without extended social effort (Wang & Reid, 2009). Secondly, computer technology was highly palatable to people with ASD (Stendal et al., 2011). Ke and Im (2013) noted that technology had an intrinsic appeal because individuals with HFA were visual learners and exceled when learning material was presented in a visually stimulating format.

Educational equity. Lastly, technology increased educational equity (McLaughlin, 2010). Rural schools and low-income areas were at a disadvantage for providing trained educators (Mueller & Brewer, 2013). Hence, with the careful and deliberate use of technological interventions, the needs of diverse learners with ASD were met (Rajendran, 2013). With the

advancement in the development of software programs, individuals could access the intervention program in any place with an internet connection (Whyte et al., 2014). Furthermore, the online programs were available for lifelong intervention strategies in which individuals with HFA used the software program and continued to reinforce social skills (Nikopoulos & Nikopoulou-Smyrni, 2008).

Critique of Previous Research

Since diagnoses of people with ASD increased (Center for Disease Control, 2019), researchers conducted qualitative and quantitative studies that depicted the effectiveness of technology as an intervention and helped improve social skills in people with ASD (Bekele et al., 2014). The recurrent conceptual framework incorporated two common themes among research: Theory of Mind (ToM) and the persuasion theory (Schwartz et al., 2014). ToM was the theory that people were able to understand other people's feelings or perspectives and act accordingly in a empathetic manner (Ploog et al., 2013). The persuasion theory was a basis for persuasive technology, which was "any type of computing system, device, or application that was designed to change a persons' attitudes or behavior in a predetermined way" (Odom et al., 2015, p. 3806). The theories provided a foundation for designing experiments (Den Brok & Sterkenburg, 2015). Researchers examined the benefits and disadvantages of using technological aids as intervention strategies that boosted social competence in people with ASDs by integrating key components of both theories (Den Brok & Sterkenburg, 2015).

Absence of follow up. While the researchers argued that there was strong qualitative evidence that use of technology benefited people with HFA (Lahiri et al., 2015), there was also a lack of longitudinal follow-up studies. Herrera et al. (2008) found success for having elicited spontaneous play by providing two participants with VR interventions that targeted social play

skills using their imagination. Herrara et al. (2008) concluded that technology can be used in administering successful social skills interventions. Yet, there was no implication of a follow-up study or questionnaire.

Effectiveness. Ploog et al. (2013) utilized a grounded theory approach that assessed the effectiveness of CAT. They evaluated one study in which the researchers claimed success for one out of two experiments where they taught participants how to read the perspectives of others. The first experiment was designed using CAT to administer the Sally-Anne False-Belief Task, in which there are several scenarios where Anne hid objects from Sally. The participants were to predict what Sally would say, do, and think. All the participants were highly successful.

A second part of the experiment proved more difficult for individuals with HFA. Distant transfer tasks consisted of scenes such as "The Smarties Task", where a box labeled Smarties Candies contained pencils (Ploog et al., 2013). Participants with HFA could not comprehend why there were objects inside the box other than those indicated on the label. Regardless of the immediate corrections after the unsuccessful posttest, the individuals were still unable to pass the test. Unfortunately, Ploog et al. (2013) did not indicate that the researchers completed a follow-up study measuring the long-term retention of learned social skills. Furthermore, the researchers did not adequately explain the importance of the information to the academic research community.

The conclusion section summarized the multitude of quantitative and qualitative studies using CAT which addressed deficits in social, communicative, and language development in children with ASD. The lack of progress displayed by the participants informed researchers that the distant transfer tasks did not enhance participants' ability to understand the perspectives of others. Therefore, the results from the experiment were important for researchers and

technologists to consider when they developed interventions integrating tasks similar to the distant transfer tasks. Researchers dimensionally analyzed the results and concluded that additional hypotheses would need to be developed for further research (Ploog et al., 2013). A longitudinal approach measured long-term social skills improvements (Whyte et al., 2015).

Effect-to-cause argument. Researchers aimed to prove an effect-to-cause argument where they calculated statistical data revealing that individuals with ASD have increased social skills after participating in a specific study. Ke and Im (2013) conducted a study with four participants in grades four and five. The VR tasks consisted of recognizing body gestures and facial expressions of a virtual communication partner, responding appropriately and maintaining communication in a school cafeteria, and interacting positively at a birthday party. The researchers used descriptive statistics that illustrated social gains in participants after completion of intervention strategies. Use of baseline data to post-test data signified an improvement in social skills. Ke and Im (2013) also included a parental satisfaction section in which the participants' parents could express their opinions. This was a good form of practice because parents assisted researchers in gauging the effectiveness of the intervention. Yet, the transferability of skills to the real world was not thoroughly examined and significantly impacted the effect-to-cause argument (Schwartz et al., 2014).

Unscripted virtual environment. Beach and Wendt (2014) conducted a unique study involving task-free immersive virtual reality. The experiment was developed to mimic real life as unscripted and unpredictable; participants were exposed to a social realm that normally made them uncomfortable in real life society. The two participants felt that the intervention was beneficial and improved their social competence; however, only one participant stated that he felt less stress when he engaged in person-to-person conversations after the intervention. The

researchers stated, “the IVE was real enough for the students to transfer some of their skills from virtual scenarios to the real-world scenarios” (Beach & Wendt, 2014, p. 40). Unfortunately, this statement was unfounded. Even though the participant’s perspective was positive, there was no concrete evidence that he had long-term retention of the necessary conversational and social skills taught in the intervention. Thus, the effectiveness of technological interventions could not authentically support the initial theory.

Beach and Wendt (2014) agreed that another weakness was the length of most of the case studies. The cause-and-effect argument was based on the shortened time frame of interventions and the length of skill retention. Beach and Wendt (2014) agreed that the limited amount of time, two weeks in the simulator, may have impacted the actual increase in the improved display of social skills. The researchers hypothesized that a longer duration may have produced a higher increase in social competence.

Immersive virtual environments. Another example was a brief case study conducted by Wallace et al. (2010), which involved IVEs that delivered a realistic depiction of a school playground, residential street, and school corridor. Although the experiment was developed to have high quality VR effects as well as realistic representations of social scenarios, the case study was designed to be relatively short, using three different immersive virtual reality scenes in one session. Researchers noticed that participants had difficulty interpreting the avatar’s intentions. With an extended session over weeks or months, researchers would have been able to more realistically validate their findings and assess whether VR interventions were successful in achieving a higher level of social competence (Wallace et al., 2010).

Authority argument. For researchers to use the authority argument, they would have to conduct their studies for an extended period because more authentic data would strengthen the

researchers' claims. Kandalaft et al. (2013) administered an intervention of 10 sessions, which lasted for five weeks. The researchers integrated the ToM concept into the intervention and produced an increase in social competence for people with ASD and HFA. They validated their data by recording responses of the participants' repetition of the target skill administered through various sessions. Kandalaft et al. (2013) concluded that there were no significant gains in ToM. They hypothesized that the eyes task portion, reading the emotional intention of others, was too difficult for individuals with ASD. This information was vital to the future development of studies that targeted interpretation of social gaze.

Additionally, Stitchter et al. (2014) provided participants with a full Social Competence Intervention (SCI) curriculum, which consisted of five units over several months. With the elongated time, the researchers possessed more authority to make conclusive statements regarding the failure of the eyes task portion of the experiment. The statements were important when they evaluated their results and analyzed how they could change the format of their research. They could also propose an alternative when designing a successful social eye gaze program that may have included certain scenarios and less complex emotions (Hochhauser & Grynszpan, 2017).

Chapter 2 Summary

There were obvious reasons that research was conducted within the intervention field of study (Whyte et al., 2015). The number of ASD diagnoses has continued to increase; in 2000, one in 150 children were diagnosed with ASD as compared to 2019, when one in 68 were diagnosed with ASD (Center for Disease Control, 2019). There has been a demand for successful interventions for students in the public school system (Valenzuela et al., 2006). As technology has continued to advance, use of technology and technological aids has become an alternative

method for administration of social skills interventions (Goldsmith & LeBlanc, 2004). Thus promisingly, previous researchers who conducted VR studies have concluded that there was evidence supporting the use of VR in social skills intervention strategies in clinical studies (Saiano et al., 2015).

In context, the humanistic issue was the societal responsibility and awareness that there was a requirement to provide individuals with HFA an opportunity to enhance their social confidence for integration within society (Best & Winslow, 2015). Accomplishment of this task involved all members of the community, especially stakeholders (Walker, 2017). Researchers developed experiments involving the use of technology. Parsons et al. (2004) claimed that "computers offer a predictable and consistent environment in which the pace of working can be suited to individual needs" (Parsons et al., 2004, p. 449). Since the needs of individuals varied, technology was used because the digital platform was flexible. Adolescents with ASD used VR and learned job skills (Strickland et al., 2013), while primary-aged children enhanced their imaginative play skills using web-based social stories and open-forum games (Jeekratok et al., 2014). There was an infinite number of scenarios designed to meet the specific individual needs of the person with HFA (Wang & Reid, 2009).

Previous researchers have established a conceptual framework that incorporated the concepts of educational equity, ToM, and persuasive technology (Odom et al., 2015). The theories outlined the need for individuals with ASDs to gain social competence (Schohl et al., 2014). There was empirical evidence and logical reasoning so researchers assumed that further investigation was warranted when examining the use of technology and technological aids for the provision of successful social skills interventions (Ueyama, 2015).

Chapter 3: Methodology

This phenomenological study incorporated essential accounts of educators regarding their experiences with technology. They discussed their personal and professional opinions regarding the use and implementation of technology integration while delivering interventions to their students with HFA. The information was gathered through extensive interviews with the participants.

Introduction to Chapter 3

There is an astounding increase in the identification of children with ASD. With one in 68 children diagnosed annually in the United States (Center for Disease Control, 2019), there is a demand for educational equity in the public school sector (Ishimaru, 2018). Educational equity is used to indicate that all students are given the same educational opportunities, regardless of race, gender, ethnicity, religion, or disability (Valenzuela et al., 2006). For students with HFA, the equity can be achieved when educators provide academic interventions (Best & Winslow, 2015). An Individualized Education Program (IEP), in which the general and special educators are responsible for providing resource services and interventions (U.S. Department of Education, 2019), is created for students with disabilities in an attempt to achieve educational equity.

In order to comprehend all facets of educators' experiences using current intervention strategies, I gathered the information through conduction of interviews in which educators expressed their experiences, feelings, and opinions regarding the use of technology within these strategies. I found that there was selective technology integration within intervention strategies, due to certain factors such as unavailable devices or exclusion from the IEP, for students with HFA. It has been noted in previous research that these students would benefit from the use of technology (Mueller & Brewer, 2013). Therefore, by understanding how educators experienced

the available technology, public school administrators and educators would be able to modify their delivery of resource services and incorporate certain types of technology or assistive technology with readily available electronic devices and specific software programs.

The research problem addressed the minimal availability of technology for integration within intervention strategies for students with HFA. The focus was on the direct experiences, feelings, and opinions of educators on the IEP team committee as to why they may or may not have included technology or technological aids in a student's IEP. Thus, a qualitative approach was the most practical and sensible means to conduct a qualitative study (Smith, 2017). Qualitative research with a philosophical basis was founded on empirical data; therefore, researchers considered the entire experience of a person as it pertained to the issue or problem (Levy, 2006).

Using this methodology, I was able to interpret the experiences of the educators in a multi-dimensional perspective, which led to a specific and overarching theme, minimally available technology for use during intervention strategies for students with HFA, using Schatz's (2015) ideas regarding interpretation and inference. I then utilized hermeneutics with epistemology and ontology, which led me to the interpretation of an analysis (Schatz, 2015) of the educators' personal experiences regarding technology use within intervention strategies for students with HFA.

As the primary issue, I had to first understand how the educators experienced usage of technology with students during intervention groups when implementing evidence-based practices. General and special educators were the key component in the academic infrastructure of all scholastic platforms (Valenzuela et al., 2006). With their expertise, they directed sensible and successful practices for the continued use of technology integration, when accessible, within

intervention strategies for students with HFA. There was a general practicality to the use of technology, specifically electronic platforms, for professional job training, military training, and education (Vasquez et al., 2015). Accordingly, this study was relevant to current instructional practices by investigation into the use of technology (Skrla & Scheurich, 2004) within intervention strategies for learners with disabilities that were diagnosed with HFA.

Research Questions

In order to address the minimally available technology and technological aids available for the use of technology integration within interventions for students with HFA and technology accommodations in their IEP, I focused on the following research questions:

- How do general and special educators describe their experiences using technology during interventions for students with HFA?
- What factors are IEP team committee members considering when they decide to include or refrain from adding technology accommodations within an IEP for students with HFA?

Purpose and Design of the Study

This study was conducted qualitatively because there was a strong philosophical aspect (Husserl & Dermot, 2012) to understanding the experiences of educators who utilized minimally available technology during intervention strategies for students with HFA. As a result, there was an underlying secondary issue of educational inequity (Skrla & Scheurich, 2004) due to the minimal use or absence of technology integration within intervention strategies for students with HFA.

Since the public school system has an obligation to provide free education despite geographical location (McLaughlin, 2010), the issue affects stakeholders in the United States.

Thus, as Stake (2010) indicates, a qualitative approach is appropriate for studies exploring a philosophically based problem. The overall comprehensive human perspective is philosophically and dimensionally analyzed by researchers (Creswell, 2013).

Purpose. The purpose of this study was to describe the experiences and personal opinions of general and special educators who utilized or excluded technology during evidence-based interventions for students with HFA. Sergi and Hallin (2011) suggested using rich and thick description to relay participants' experiences thoroughly. Therefore I used rich descriptions that recounted the educators' narratives in full detail for administrators, educators, or other researchers to assist them in developing an educational plan or intervention strategies for future enhancement of learning experiences for disabled students, because according to Valenzuela et al., (2006) when aiming to increase educational equity, strategies must be delivered to students in need. After analyzing the shared phenomenon (Creswell, 2013)—the minimally available technology for integration within interventions—a secondary issue of educational inequality was uncovered.

Paradigm shift. Since there has been a distinctive paradigm shift in the platform of education, especially in the electronic formats of distance education and integrated technology within the curriculum (Dykman & Davis, 2008), the study I conducted was important. Diverse learners are experiencing disparities in educational opportunities, which leads to educational inequity (Best & Winslow, 2015). Many students with disabilities have been found to be underserved without proper intervention services available to them (McLaughlin, 2010). Students with HFA may be at a disadvantage when attempting to access the full curriculum, due to an absence of technology or technological aids incorporated within intervention strategies and evidence-based practices.

Students with HFA required additional resources for their learning needs (Stichter et al., 2014). Provision of technological aids and various electronic devices was beneficial to students when accompanying traditional intervention strategies such as teacher-led instruction (Goldsmith & LeBlanc, 2004). Thus, understanding how educators utilize and experience technology incorporated within intervention strategies may be helpful in developing technological aids.

Conceptual aspect. The conceptual aspect of qualitative research involved understanding human behavior from the participant's point of view (McLeod, 2008), which was obtained through interviews and then transcribed. The interviews were minimally structured with guidelines, in an open-ended question format, to lead the participant in a specific direction (Seidman, 2013). The information gleaned from the data transcripts was sorted and coded according to emergent themes conducive to understanding human behavior (MacPhail, Abler, & Ranganathan, 2015).

Design. In this phenomenological study, I used methodological assumptions in which I looked closely at the process and language of the research and developed an emerging design based on inductive logic (Fereday & Muir-Cochrane, 2006). In this process, it was practical to cast aside generalizations; instead, I analyzed the details that developed the context of the content (Creswell, 2013). Furthermore, I developed an overall holistic theme from the participants' language, which included recurrent statements. Smith (2017) delineated that empirical phenomenological research using methodological assumptions relied on an individual's own experience, which led the researcher to obtain holistic descriptions. Hence, the descriptions provided the foundation for a reflective analysis of the participants' experiences.

The methodological assumptions also contained phenomenological reduction aspects that did not incorporate presumptuous generalizations of the information (Cogan, 2017). As the

researcher, I looked at examples without theoretical presuppositions because phenomenology is a science of consciousness rather than empirical practices alone (Sawicki, 2016).

Prior literature reviews. Evident in literature reviews, previous researchers have employed quantitative and qualitative approaches in which the studies benefitted the academic and general community (Cheng et al., 2015). While statistical quantitative studies are extremely valuable for testing hypotheses, the qualitative approach was necessary for assessing the experiences (Seawright & Gerring, 2008) of educators who utilized technology within interventions.

Consider Cogan's (2017) statement:

> There is an experience in which it is possible for us to come to the world with no knowledge or preconceptions in hand; it is the experience of astonishment. The "knowing" we have in this experience stands in stark contrast to the "knowing" we have in our everyday lives, where we come to the world with theory and "knowledge" in hand, our minds already made up before we ever engage the world. However, in the experience of astonishment, our everyday "knowing," when compared to the "knowing" that we experience in astonishment, has shown up as a pale epistemological imposter and is reduced to mere opinion by comparison. (p. 1)

Personal experiences. Educators had preconceived notions, perhaps even biased, towards a type of intervention strategy or technological aid they preferred to use because of the ease of administration, availability, time constraint, or personal preference. Therefore, using Sawicki's (2016) principles for eliminating bias and contemplating personal truths, when the educators cast aside their biases, preferences, or preconceived notions, they would experience true astonishment

and reflect on their actual experience with technology while delivering evidence-based intervention strategies to students with HFA.

Furthermore, the awareness of consciousness was a fluid model (Husserl & Dermot, 2012) when applied to comprehending personal experiences with technology incorporation. Educators experienced multiple levels of astonishment because the response to strategies varied among students using different types of technological aids. Application of the knowing or conscious realization of internal knowledge relayed the deepest, personal accounts of experiences and meaning (Heidegger, 1962).

Generalizability. The goals and objectives did not generalize concepts for a blanket statement that applied to all educators in society across the world. Accordingly, generalizability is not necessary in a qualitative study (Cogan, 2017). Merriam and Tisdell (2015) discussed the error in analyzing a qualitative study based solely on evaluation of the research in terms of generalizability. Instead, they stated that qualitative research should be methodological and interpretative, depending on the specific research problem and study.

Research Population and Sampling Method

The public school system I used for research represented a diverse community of students, teachers, and socioeconomic classes. The large school district contained more than 130,000 students and over 20,000 employees. Most of the schools were based in urban areas with a high mobility rate. There was a wide range of demographics among the students, who had disabilities, were impoverished, and privileged, and the staff. Special education services were provided to approximately 14,000 students and about 70 schools were categorized as Title I schools. These schools received a special grant from the federal government to provide the

impoverished student population an increased chance of equalized education (U.S. Department of Education, 2019).

Valenzuela et al. (2006) emphasized the challenges that students with disabilities suffer in comparison to their peers without disabilities. In such a large and challenged school district, students with HFA are at an even greater disadvantage than their nondisabled peers. Regardless of the demographics, funding, or socioeconomics, educational equity is the civil right of every public school student in America (Walker, 2017). Statisticians calculate that there is an increased need for highly qualified teachers to deliver evidence-based practices to students with disabilities or comparable technological aids that can assist educators in equalizing education (Skrla & Scheurich, 2004).

Participants. The participants were employees of the study who would have to fulfill several prerequisites prior to employment or during continued employment. Employers in this public school district required all special and general educators to have a bachelor's degree from an accredited university and to be certified to teach in their content areas. Therefore, educators had received the required higher-level training to effectively deliver quality education to diverse learners. Specialized training and classes were also mandatory when renewing certifications. Both general and special educators regularly attended professional development workshops.

In order to address the needs of diverse learners, the public school system mandated that all general educators receive specialized training. The general educators acquired a certificate after they completed a special education class regarding the inclusion of disabled students within the general education classroom. While this 45-hour program trained employees describing IEP regulations and techniques and strategies, ASDs were not the focus of the course.

Data saturation is critical for validation of the results and the researcher should have chosen enough participants (Mason, 2010). Thus accordingly, in my study, I chose to analyze experiences of educators from two schools in a specific geographic, socioeconomic, and demographic population. The educators were based at two schools because there were insufficient participants in one school. Typically, researchers who utilized a phenomenological qualitative study approach aim for 12–15 participants; however, due to the unavailability of enough general and special educators from one school, I chose two separate schools and 18–20 participants. Having two schools did not require me to double the original number as I achieved data saturation with 18–20 participants. The participants relayed similar thoughts, statements, opinions, preferential technological use, ease of administration using technology, and emotions directly related to technology integration within intervention strategies for students with HFA.

The study's participants were selected because they all experienced the same phenomenon—integration of technology in intervention strategies for students with HFA. The individual educators were asked to participate according to their experience, because they had provided interventions to that specific population of students. They reviewed a student's IEP to determine the disability code as HFA; the placement was 80% or more time spent in the general education classroom. There were no other requirements, such as age, race, ethnicity, length of time teaching, or gender, for the educators.

In this study, the participants were from two types of populations, special and general educators. Since resource students were federally mandated to be in the least restrictive environment, both general and special educators were responsible for implementing strategies within the classroom (Maryland Online IEP, 2019). Thus, general and special educators collaborated because students who received services spent most of their educational day

integrated within the general education population. In order to assist the general educator, resource teachers decided they would either remain in the general classroom for support, or pull out groups. In this case, the participants were all educators in the same school district, having worked with a similar demographic population of students with HFA.

The first part of the sample consisted of general education teachers. These educators were still responsible for providing intervention services to student with HFA because a student with an IEP was housed within the general education classroom at least 80% of the time (U.S. Department of Education, 2019). To address the placement issue, the school board required general educators to have completed at least 40 hours of training in a special education course. Yet, the course instructor only briefly touched on assisting students with HFA. Instead, the educators were trained on how to properly and legally implement IEP services for the student.

The second part of the sample consisted of special education teachers. Specific hours set forth in the IEP determined when special education teachers worked with the disabled students (U.S. Department of Education, 2019). These teachers had earned their Standard Professional Certificate with a concentration in Special Education. They were responsible for creating, revising, and implementing an IEP. Incorrect implementation of an IEP could result in litigation (U.S. Department of Education, 2019). The special educators attended professional development workshops once a month and learned new methods, strategies, and interventions for successful administration of services to student. When they returned to their school building, they shared the newly acquired skillset with all teachers and administrators in the building.

Special education programs. This school district had several types of special education programs. There were inclusion classrooms, self-contained separated special education classrooms (intensive), and resource services conducted primarily in the general education

classroom. Some schools did not provide intensive special education services; if a student qualified for the self-contained classroom, the county supplied transportation to the nearest school that provided those services.

Educators often changed their own placements in different schools within the county. Therefore, the participants may have had experiences in one or more of the special education service programs. However, the educators from the two schools included in this study had worked with students with a disability code of HFA based in a general education classroom for 80% or more of their time. This categorized the students as having HFA for the purpose of this study.

School district. Due to the fluctuation in funding in different counties and states (U.S. Department of Education, 2019), it was most reasonable for this study to be conducted within the same school district. The funding varied slightly from school to school; however, the district had a specific budget for the technology component. Each school in the county had a moderate amount of technology for student use. The amount of technology throughout the county was accessible to all schools and teachers, which enabled me to conduct the study and trust the evidence gathered from interviews.

Sampling. Qualitative research is based on non-probability and purposive sampling rather than probability or random approaches. The reason is because random sampling is detrimental to the conclusion of a qualitative research study (Eberle, 2015). Therefore, sampling choice was critical in this qualitative research study (Cohen & Crabtree, 2006). As the researcher, I aimed to ensure that the sampling choice was purposeful and pertained to the research question at hand. A participant that provided good information when he or she

articulated clearly, was reflective, and was willing to share with the interviewer was considered valuable (Coyne, 1997).

Many factors determined the choice of participants. Sampling was based upon the availability of subjects who had experienced the phenomenon, had the time to participate in the study, and were located at specific facilities or geographical locations (Seawright & Gerring, 2008). Patton (1990) indicated that information- rich case studies required a thoughtful and purposeful sampling of informants. Gentles, Charles, Ploeg, and McKibbon (2015) referred to sampling as the process used to select a portion of the population for the study. Purposeful sampling aided in achieving data saturation, a term used when no new themes emerged from the compiled data (Nakkeeran, 2016). Hence, the purposeful criteria for choosing participants aligned with the problem being investigated. All participants in a phenomenological approach had to have experienced the same phenomenon (Eberle, 2015). They could convey an informed understanding of the research problem and central phenomenon to me, the researcher.

In this phenomenological approach, I aimed to give a voice to the underprivileged and underserved. Taylor, Bogdan, and De Vault, (2015) determined by describing the lived and shared experiences of those involved in the same phenomenon, the target sample would provide accurate information for researcher analysis of the phenomenon. Since the educators had experienced the shared phenomenon, they were the only participants.

Instrumentation

Researchers establishing specific protocols for collection of evidence through interviews set the standards for more authentic data (Opendakker, 2006; see Appendix A for set protocols). In this study, I utilized interview questions and the interviews were recorded to ensure accuracy.

Subsequently, the interview format consisted of a set of open-ended guiding questions for unled honest responses.

Interviews. Chenail (2011) cautioned that the interview questions must remain open-ended and at no point may the researcher allow the questions to convert into close-ended questions. When maintained, this protocol assisted researchers in controlling bias management or avoiding leading a participant towards an expected outcome. The researchers would assiduously construct open-ended questions that gave interviewees the opportunity to contribute their perspectives without limitations (Chenail, 2011).

Accordingly, I used Roulston's (2010) interview technique and generated open-ended questions. In having used this technique, I was able to have elicited the genuine opinions of the educators. Questions were formatted to extract personal experiences and opinions from the study's participants. Since simple yes or no questions may have been leading questions and therefore the participants were able to elaborate on a concept. A copy of the interview questions is provided in Appendix A. An example of an open-ended question was, "How do you think technology impacts your ability to administer an intervention with students that have HFA?" The participants were encouraged to discuss their feelings at length without interruption or judgment.

Levy (2006), advised to provide participants with the list of proposed interview questions in advance. Therefore, the interviewees were provided with a list of questions one week before the interview was conducted. Participants could prepare themselves for the interview by examining their experiences and recalling specific instances they believed were important. They were provided time to reflect upon personal experiences regarding the utilization of technology for students with HFA. Krefting (1991) stated that participants in a qualitative research study

would benefit from extra time to have increased their ability to extract meaning from specific experiences and discuss their personal interpretations.

Collection of data. Since the purpose of conducting a qualitative research study is to collect evidence that is advantageous to eliciting positive societal change (Den Brok & Sterkenberg, 2015), the information accumulated from the study may be useful for future researchers and technology developers. They could benefit by evaluating the collected evidence and data from this qualitative study, which analyzed the experiences of general and special educators regarding technology integration in interventions for students with HFA. I accomplished this feat by conducting interviews with the chosen participants with whom I did not have personal relationships. These participants were able to delve into deep personal opinions, feelings, emotions, and overall experiences without prejudice. Exploration of one's personal insight was an important concept noted by Bound (2011) while conducting a phenomenological study.

The educators explored their personal and professional opinions regarding their use of the available technology to implement evidence-based intervention strategies. The practices may or may not have been specifically based on the use of technology. Some of the technological evidence-based practices included: Technology-aided Intervention and Instruction (TAII) or Video Modeling (VM) as well as nontechnology-based: Visual Supports (VS) or Modeling (MD) (National Professional Development Center on Autism Spectrum Disorders, 2019).

The educators described the specific types of technology and assistive technology utilized during all evidence-based interventions. They were also able to determine which type of technological aid was readily available, how often they used that specific aid, and how responsive their students were while using the technology. Since I analyzed and interpreted the

information collected from the interviews, I was able to state conclusive results, following the advice of Seidman (2013), whom discussed the careful analysis of information gathered for interpretation that would lead the researcher to a conclusion that was credible. Thus, future researchers or technology developers would have the available information and may use it to create sensible programs or expand on discovered concepts.

Heidegger. I was able to apply Heidegger's (1962) concept of phenomenological reductionism. First, I analyzed the educators' personal descriptions of their experiences of utilizing technology during interventions for students with HFA or opting not to include specific technology in an IEP for these students. Then I applied the reductionism concept. Reductionism means that a basis of knowledge was broken down into smaller units for a more specific idea (Heidegger, 1962).

Heidegger (1962) described a person's choice to direct themselves towards a deeper subconsciousness. Accordingly, the interview questions were a set of questions I designed so educators could reexamine their consciousness of the topic—how educators experienced technology integration within intervention strategies for students with HFA. The interview question design provided educators with an opportunity to access their innermost consciousness of being, in order to analyze and relay their experiences in a philosophically purposeful manner as noted by another researcher Karob-Karpowicz (2016) when they recommended using a philosophical approach to studying data. As I asked open-ended questions, educators could deeply examine their consciousness and apply personal meaning to their experiences.

Data Collection

In the phenomenological approach, for data collection, I gathered information and used specific instrumentation methods. Harvey (2014), suggested using deep interviewing techniques

when conducting a qualitative study. In this study, I obtained data by conducting comprehensive interviews. However, the process of data collection also involved authentication of the collected evidence (Cohen & Crabtree, 2006).

Qualitative approach. Regarding qualitative studies, Moustakas (1994) described the empirical phenomenological approach in which the participants mentally returned to an important experience. They obtained extensive descriptions that provided the structural basis for a reflective personal analysis encapsulating the essences of that experience. Thus, this phenomenological approach required thorough personal interviews where the participants self-reflected and gained deep insight into their lived experiences of the phenomenon (Eberle, 2015).

Interviews. The interviews were the focus of the investigation (Cogan, 2017). Important information was obtained from the participants' in-depth interviews, which recounted previous positive and negative experiences of using technology during interventions or when the IEP team members opted to eclude specific technology in a student's IEP. As the researcher, my role was to directly engage participants in a conversation that explored their inner and outer world, including their perceptions, reasons, and social reality (Schultz & Avital, 2011) in regards to the use or avoidance of technology. Therefore, the interview was structured to include open-ended questions (McCaslin, 2003). An example of an open-ended question included: "How do you choose technological aids when providing intervention services to students with HFA?"

The interview process occurred in multiple steps (Rosas, 2006). The first interview was conducted in a school setting, specifically the educators' own classrooms. Since they were in their natural setting, this may have affected how they responded to open-ended questions. The atmosphere and artifacts in the room could have aided in memory recall and expanded thought. The participants were encouraged to express their true feelings in the comfort of their workspace

and environment. Seidman (2013) cautioned that the environment where the interview has been conducted may influence the outcome of the interview. Subsequently, he suggested multiple interviews in various settings.

Opendnakker (2006) listed some characteristics of face-to-face interviewing techniques, including the ability to interpret social cues, voice intonation, and body language. A researcher uses face-to-face interviews to determine whether the participant's body language matches the statements given. However, when an interviewer uses social cues to subconsciously manipulate the interview to obtain answers they are expecting, the results are invalid (Opendnakker, 2006). Utilizing Opendnakker's guidelines, I successfully upheld the integrity of the interview by not leading with body language or social cues.

By conducting multiple interviews (Sergi, 2011), I ensured that the participants could express their experiences in rich detail. Because there were two main guide questions, each interview consisted of one main question and the relative sub-questions that followed. None of the participants requested a third interview, as they had shared their memories and narratives in complete detail when they described their phenomenon.

Setting. McLaughlin (2010) and Seidman (2013) declared the importance of the setting in which the interview was conducted for the most accurate data collection. Therefore, one interview was held in the participants' classrooms. Hence, some participants demonstrated how the physical space was utilized in their classroom during interventions and how that impacted the ability to adequately deliver instruction with technology. Some classrooms had limited space and no room to house a smartboard or other technology. Some participants claimed that their space was designed specifically for technological interventions that worked seamlessly in the

classroom, such as a computer center with preloaded educational programs. These were important components in gathering accurate data.

The second interview occurred in a setting outside the school system, which removed the participants' personal investment in the space. Here, I could dimensionally analyze how people functioned in their everyday lives (Taylor et al., 2015). The participants were able to recall additional information when separated from their workspace (Nordstrom, 2015).

Member checking. Following the interviews, the participants were given the opportunity to clarify their thoughts and statements. McMillian (2012) cautioned that qualitative researchers aimed to reconstruct reality from the participants' perspectives. Using McMillian's theory, as the researcher, I did not apply predetermined definitions or ideas about how people thought or reacted because assumptions would have invalidated the evidence collected from the participants.

Nordstrom (2015) advised researchers to record the interviews with the participants. Therefore, with informed consent, the participants allowed their voices to be recorded for greater accuracy (see Appendix B). I transcribed the interviews after listening to the recordings. The participants were asked to proofread the transcripts for accuracy (Birt et al., 2016). They also had the opportunity to clarify ideas, points, or statements. Thus, member checking was a vital process (Carlson, 2010), I used to ensure the most genuine analysis of data by avoiding misinterpretation of information.

Accordingly, the participants were given the interview transcript. Merriam and Tisdell (2015) deemed this as a paramount step to assure that interview data was legitimate in any qualitative study. Therefore, the recorded interview with analyses, interpretations, and conclusions was given to the participant and examined for accuracy. A meeting was conducted in

which the individual reread all interview transcripts with interpretations to clarify any misinformation.

Data saturation. A phenomenological interview process is lengthy, as saturation of themes has to be reached to achieve an end (Mason, 2010). Seidman (2013) discussed that saturation of information was accomplished when there was a repetitive quality to the participants' answers and no new information was learned or recorded. In this study, access to more participants (19) was beneficial in producing a more substantial amount of evidence and achieve the data saturation necessary to support my claim. While some researchers placed a practical number at which this saturation was met, Seidman (2013) erred on the side of caution and pointed out that each qualitative study was unique. He suggested a more flexible approach, which would be evident when saturation was achieved.

Authentication. Triangulation is a method used after data collection and is the pinnacle to authenticating the results if a multiple method format is used. The process of triangulation consists of researchers cross-checking and referencing the data collected to check for consistency among the evidence. This method assures researchers that the information is valid (Bjurulf, Vedung, & Larsson, 2012).

Identification of Attributes

Since this was not a quantitative study, there were no definitive variables. Instead, my qualitative study contained attributes. An attribute is a characteristic of an object, such as a person or thing. There are specific attributes to qualitative research methods (Roller & Lavrakas, 2015). In investigating the experiences of educators when they used technology during interventions for students with HFA, the attributes were the different types of technology and the educators themselves.

The attributes were all components of the study. I established a comprehensive analysis of the results using them. It was imperative that the attributes were first isolated for examination. After I scrutinized how the attributes affected the study independently, I then surmised a fluid picture of the study as a whole.

Assistive technology. The first attribute of this study was assistive technology, such as CAT, which was integrated within intervention strategies for students with HFA. Various researchers, such as Odom et al. (2015), Ploog et al. (2013), and Whyte et al. (2014) have deemed the use of assistive technology, essentially electronic devices, specific websites, certain software programs, and online gaming, beneficial for students with HFA. Educators also used the incorporation of technology within intervention strategies to teach target skills in small group lessons, and they chose to use software programs, electronic devices, specialized websites, and online educational games to support learning.

This study occurred after results were published by previous researchers that explored the CAT attribute in clinical trials, and where they provided interventions for individuals with HFA (Ploog et al., 2013). Researchers were interested in discovering what type of assistive technology was helpful in increasing certain skills. Den Brok and Sterkenburg (2015) measured the success in increased learning abilities with handheld devices and computers. Wang and Reid (2009) even made bold statements such as, "there is much to be gained from using a VR-CR (Virtual Reality-Cognitive Rehabilitation) approach" (p. 101), which indicated that they had utilized a specialized VR software assistive technology program.

Video clips. Nikopoulos and Nikopoulou-Smyrni (2008) found that their research concluded there was increased learning abilities and skill retention after use of video modeling. Therefore, another attribute of the study was short video clips that enhanced learning, which

were accessed through the internet or recorded on a DVD. The video was designed to provide a visual model or representation for students with HFA. The students with disabilities mimicked the skills demonstrated within the video in real time

Audio clips and podcasts. Audio clips and lessons via podcasts, radio, and the internet were also attributes in this study because technology was not limited to online gaming, software programs, or specific websites. For example, students accessed informational and educational podcasts through smartphones and tablets. Audio clips have been designed to provide reinforced learning in addition to traditional classroom methods (Jeekratok et al., 2014), and the educators in this study used the available alternative assistive technology while providing interventions to their students with HFA.

General and special educators. McMillian (2012) emphasized the importance of conducting a non-biased in-depth interview. Consequently, the last attributes of this study were the general and special educators. They held a pinnacle role in this research project because all the data and evidence collected during this study came from interviews. The educators provided a unique and multi-faceted dimensional perspective that described a shared phenomenon. With their stories, testimonies, and statements, I was able to discern the nature of the phenomenon and how it impacted the educational system and produce a conclusion based on the educators' accounts of utilizing or omitting technology in interventions for students with HFA.

Data Analysis Procedures

Data interpretation and analysis. Data interpretation and analysis is an important component of qualitative research. I used these processes to decipher meaning from the collected evidence (Schatz, 2015). Since there was an absence of statistical data within this qualitative

study, accurate analysis and interpretation of gathered evidence from interviews was vital in developing a conclusion (Seawright & Gerring, 2008).

The interpretation was contingent upon thorough analysis of the gathered data. The researcher would first have to dimensionally analyze the data from all points to ensure that there were multiple similar perspectives to indicate that a shared phenomenon existed (Creswell, 2013). Interpretation is the development of ideas and relating of evidence to broader concepts (Schatz, 2015). After I gathered and interpreted the information, multiple types of data were required that supported or contradicted the interpretation (Merriam & Tisdell, 2015). I was then able to interpret the collected evidence and develop appropriate themes.

The analysis of the data was studied by organizing it into manageable units of related patterns (MacPhail et al., 2015). It was an important part of determining related statements, words, and phrases. Using Merriam and Tisdell's (2015) recommendation of highlighting significant sentences or sections while analyzing the data, I obtained a more comprehensive understanding of how the participant experienced the essence and the phenomenon became apparent. Moreover, McMillian (2012) suggested that the first step of analyzing and organizing data should be separation of information into workable units. Those units became components of the emergent properties where the units did not exist in isolation for eternity (MacPhail et al., 2015). Instead, I used the guidelines from the research of McMillian (2012) and MacPhail et al. (2015) to develop a holistic overtone.

Coding. Coding the statements into themes and organizing the recorded data became the evidence I used to develop a conclusion to explain the phenomenon and its relevance to society. Coding was important because it grouped similar information into categories for easier analysis (Saldaña, 2009). This process was a type of taxonomic classification system in which specific

repetitive statements, phrases, and quotes were evident to me, as the researcher, and I developed a conclusive result regarding the existence of a specific phenomenon.

The workable units were then evaluated and separated accordingly by codes. I used Saldaña's (2009) rules for coding to search through data for regularities and patterns. Those patterns consisted of words and phrases that represented the recurrent topics and similar schemes. I was then able to designate or design distinct codes befitting of the study.

Bogdan and Biklen (2003) stated that, in a qualitative study, the research questions and concerns generated certain categories for a family of codes. They suggested four types of common codes: setting/context codes, definition of the situation codes, perspectives held by subjects, and subjects' ways of thinking about people and objects (Bogdan & Biklen, 2003). The choosing of codes would be commensurate to the appropriate data segments.

The above codes were a sample of repetitive themes and represented a small portion of available codes for organizing data (MacPhail et al., 2015). Therefore, I used the suggested common codes because my qualitative research study was conducted as a theoretical approach. Consequently, it was necessary to assign codes that entailed specific language and words, because some codes consisted of a single word or short phrase that symbolically assigned summative, salient, essence-capturing, and evocative characteristics for a portion of language-based or visual data (Saldaña, 2009).

Purpose of coding. The purpose of coding was to establish themes (MacPhail et al., 2015). Frequently, the development of the themes occurred from the inside out; logic was used inductively, which resulted in conclusive statements because qualitative data analysis was primarily inductive and comparative (Merriem & Tisdell, 2015). The participants' statements

were arranged into clusters of meaning for a written textural description of the experienced phenomenon to discover emergent themes.

Dedoose.com. In order to code my collected evidence, I first used a program available through the internet. Dedoose.com is a coding program where researchers can collaborate in real time to interactively code data. It is a utilization engine that provides analysis of information in hidden patterns. The program accesses and codes all files, including media files, in which researchers can visualize data (Dedoose, 2017).

Researchers who used dedoose.com were able to create various charts, graphs, and tables to display data in visual formats after it was coded by the program. First, a bubble plot calculated the 4-D relationship among data. Next, a code co-occurrence matrix revealed patterns and how the code system was used to determine results. Then, the code cloud produced visual variations in code use. Lastly, descriptor ratio pie charts were available (Dedoose, 2017).

Dedoose.com also contained analysis applications. A filter program categorized data in numerous formats. When the filter was changed, the researcher could study how the codes and charts changed. Therefore, active data was toggled and imported to migration tools for qualitative analysis (Dedoose 2017).

Furthermore, dedoose.com was designed by programmers to sort, tag, and file excerpts of data with the correct code (Dedoose.com, 2017). The algorithmic program designated specific codes for repetitive segments. When I used dedoose.com, I thought I would be able to profoundly analyze, cross-check, filter, and code my data appropriately (Saldana, 2009).

Phenomenological reductionism. Another data analysis procedure included Husserl's process of phenomenological reduction steps (Luft, 2004). The process includes bracketing, horizontalizing, clustering the horizons into themes, and organizing the horizons and themes into

a coherent textural description of the phenomenon (Cogan, 2017). Bracketing was the first step in organizing the collected data. Once the phenomenon was bracketed, the rest of the irrelevant information was set aside. The research process was based upon the topic and question. Horizontalizing was a critical process because all statements had equal assigned value; thus, as the researcher, I was able to maintain objectivity and minimalize ideology for accurate coding and organization of data (Husserl & Dermot, 2012). Clustering the horizons into themes was a concept in which all participants' statements were subjected to close reading and irrelevant information was discarded. Then, the horizons and themes were organized into a coherent textual description of the phenomenon (Smith, 2017). I arranged the remaining pertinent information into clusters and finally described information through rich description (Sergi & Hallin, 2011).

Limitations and Delimitations of the Research Design

All researchers have encountered limitations when they conducted research studies. Unfortunately, limitations were considered constraints that may have decreased the quality of the results of a qualitative research approach (Levy, 2006). Researchers will have provided countermeasures that decreased the impact on the results of the study due to the limitations. These limitations are described below.

Limitations. Since my study was a qualitative study, the sample size remained relatively low. Small sample sizes are a characteristic of the phenomenological approach and required me, as the researcher, to collect extensive detail of the site as well as the individual (Creswell, 2013). A limited number of participants was preferable to re-convey accurate information through rich description (Turner, 2010), therefore I utilized a small sample size for my study. However, if the sample size was too low, such as two participants, the evidence collected from the qualitative

study may not have been validated by methods of triangulation, data saturation, redundancy, or member checking (Nakkeeran, 2016).

Time constraints. Furthermore, time constraints could have been an issue. Since the amount of information to be gathered from individuals recalling experiences, thoughts, and emotions was critical to a qualitative study, time constraint may have been a factor and, therefore, a limitation (Stake, 2010). "The phenomena being studied by qualitative researchers are often long and episodic and evolving. It often takes a long time to come to understand what is going on, how it all works" (Stake, 2010, p. 29). Stake described the necessity of elongated time when studying human subjects.

McCambridge, Witton, and Elbourne, (2014) maintained that sufficient time was required to gather relevant and meaningful data from a qualitative study. Thus, I allowed sufficient time while organizing and implementing the study to achieve a more stable picture of the behavior responses from participants. Even though the phenomenon could have taken years to investigate, the study was to be conducted over the course of several months. Yet, the study still produced an accurate depiction of the present-day issue despite the time limitation, because the number of participants provided data saturation. According to Mason (2010), when data saturation occurs in any qualitative study, the results are valid. Additionally, the educators had several years' experiences with this phenomenon, prior to this qualitative research project.

Delimitations. Delimitations affected the outcome of the study. There were several that should have been considered when examining this phenomenon. Socioeconomic standing, demographics, and regional location were some examples of delimitations.

The socioeconomic status of the chosen school system directly impacted the students and staff. Reduced funding was problematic and negatively affected the resources allotted to schools.

Because all schools in this public school system were part of the same funding and budgeting unit, this was a delimitation to this study.

The demographics of the public school system in my study, mainly consisted of minority students. Comparatively, at the time, another school district in Maryland had a diversity score of .37, and consisted of approximately 27% minority students: Asian, American Indian, African American, Hispanic, and two or more other races. The numbers of the neighboring county were lower than the Maryland average of .40.

Another delimitation was accessing educators from Maryland in a specific county public school system. Since the educators I interviewed were based in a specific county in Maryland, I could ascertain accurate and true data. I was informed that the entire county accessed a single budget and determined how it was disseminated to individual schools.

Validation

Several terminologies were germane to the description of methods to achieve authentic results from the qualitative study. Lincoln and Guba (1985) proposed terms such as credibility, authenticity, transferability, dependability, and confirmability. Researchers that performed those processes created trustworthiness of the information gathered from the study. Establishment of credibility, reliability, and validation of information was critical when conducting a research study (Sousa, 2014). There were numerous methods, processes, and techniques that researchers utilized when they authenticated their results, including member checking, triangulation, peer debriefing, and saturation of data from interviews (Birt et al., 2016).

Credibility. By definition, when something has credibility, it is trustworthy (Golafshani, 2003). As the researcher, I aimed to provide trustworthy data when I conducted my qualitative

study. Establishment of trust was accomplished by proving that data and evidence collected from studies were authentic.

Bogdan and Biklen (2003) wrote that the information should be appropriately segmented. By using that method, I was able to achieve credibility and validation of results. The segmentation process was necessary in determining the relational aspects of each piece of data. Irrelevant information was discarded and replaced with relevant evidence. By segmenting the data, the scope of the collected interview transcripts and observational notes narrowed (Roulston, 2010). I effectively eliminated extraneous information to reveal the redundant themes more easily. As Oliver-Hoyo and Allen (2006) stated in their previous research, information would start to converge. Thus, since I used an efficient tracking, collecting, sorting, and coding method, the data was authenticated and validated (Birt et al., 2016).

Furthermore, as the researcher, I aimed to follow Eisner's suggestions for specific methods for validation of data. I employed three systems that increased trustworthiness: structural corroboration, consensual validation, and referential adequacy (Eisner, 1991). These processes increased the credibility of the study.

Structural corroboration. In structural corroboration, multiple types of data were used that supported or contradicted the interpretation of the evidence (Morse, Barrett, Mayan, Olson, & Spiers, 2002). The data consisted of information from the interviews. By cross-referencing the concept or phenomenon through several types of data, a redundancy would develop if there were data saturation (Mason, 2010). In addition, following Carlson's (2010) work, when I effectively used structural corroboration by appropriating certain evidence, data saturation resulted in redundancy and comparative consistency.

Hence, regardless of the method used to obtain the data, the multiple types of data analyzed contained identical topics, statements, words, phrases, and actions. Those are important steps in structural corroboration (Eisner, 1991). The steps are necessary for the researcher to validate the information and increase credibility.

Consensual validation. Sousa (2014) advises that researchers should always seek the counsel of respected members of the field in which the study is being conducted for verification that the evidence collected is relevant and accurate. Ergo, consensual validation consists of the opinions of others who were deemed competent in the same field of research. These individuals concurred that the phenomenon existed because the description, interpretation, evaluation, and themes of the data were all correct.

Consensual validation was also known as peer debriefing. The process included members from the academic community who verified that the results were valid and related to the existing concepts. Peer debriefing increases the authentication of information gathered by the researcher.

In a qualitative study, the final procedure for validating information was peer debriefing (Morse et al., 2002). Therefore, I sought the counsel of respected peers within the field of academia. Another member of the educational community agreed to read and assess the contents of the study. A respected member of the academic field whom is a PhD holder, scoured the gathered information for inconsistencies, bias, incomplete thoughts, and disjointed connections and assisted me in clarifying the final meaning of the study. In addition, another special educator, peer debriefed my results for increased accuracy.

Referential adequacy. Referential adequacy is a database containing information that compared current data against previous data. These databases did not have to be in an electronic format; instead they may have included photographs, book text or print. The information was in

raw segments of unanalyzed data that were archived for later recall and comparison measurements (Onwuegbuzie & Leech, 2007).

Processes used for increased credibility. It was essential to employ the above measures of structural corroboration, consensual validation, and referential adequacy, because Morse (2002) noted in his research that when the processes were used, data had been validated. I used certain components of structural corroboration, such as interviews and cross- referenced evidence for redundancy and consistency. I also used consensual validation, which was paramount in the validation of information because the third party that reviewed the information was knowledgeable, but non-partial and objective (Carlson, 2010). I was able to utilize referential adequacy by referring to research from previous literature reviews and peer- reviewed journals that provided a baseline for the technique (Den Brok & Sterkenberg, 2015).

Thus, increased credibility for data compiled from humanistic perspectives was quite challenging. As the only researcher, I alone was unable to rely upon self-analysis, and instead engaged not only in structural corroboration, consensual validation, and referential adequacy, but member checking as well. Increased number of processes used to validate qualitative data strengthened results and proved the data credible (Eberle, 2015).

Member checking. Member checking was an essential procedure to legitimize collected evidence (Cohen & Crabtree, 2006). Overall, in qualitative studies, validation is increased by involvement from the participants when they reread and assisted in construction of the phenomenon's meaning (Carlson, 2010). Therefore, the participants were included in verifying their statements. The participants were educated and skilled individuals who reviewed collected data that had been categorized into appropriate themes. With the participants' verification of the

trustworthiness of the evidence collected, authentication of the data increased. The participants reread transcripts and clarified misinterpretations, which increased veracity.

Furthermore, using Roulston's (2010) research suggestions, I utilized the member checking process that allowed participants the opportunity to contemplate their role in the study; they decided which experiences to share. This process was important because the participants could confirm their voice was heard as spoken. They were afforded the opportunity to clarify any statements or interpretations they felt were incorrect or misconstrued.

Accordingly, member checking was an integral part of the process of authenticating gathered evidence. In this process, the participants were consulted for the analysis and interpretation of the interview data (Carlson, 2010). This process would authenticate the evidence. Therefore, it was critical to allow participants to member check the interview transcripts in order to gather validated data as evidence. Consider this statement:

> More important, the researcher can check with the participants about codes, categories, themes, patterns, and other findings to see if these are viewed as fair, reasonable, accurate, and complete. This can be accomplished by sharing drafts of final products, in writing or by interviews, and allowing participants opportunities to make comments. (McMillian, 2010, p. 275)

There was another benefit of member checking. According to Creswell (2013), when participants are involved in the qualitative research process, they feel more invested in the study. After all, the point of a qualitative study was to voice an issue people experienced but did not have the means to express (Cohen, & Crabtree, 2006).

Thick and rich description. Another facet of the research design was that rich description was chosen in order to provide personal accounts (Sergi & Hallin, 2011) of how educators

experienced technology while delivering intervention strategies to students with HFA, what their reasons were for the IEP team members opting not to include technology in a student's IEP, and what the technological experience meant to them and their students. The available technology consisted of iPads, Chromebooks, desk top computers, and recording devices. The assistive technology available included software programs, online websites, and computer applications.

Personal narratives were a vital piece of evidence, as the educators' detailed accounts were full of statements, phrases, and quotes that led to an overall theme and explicated in full. Ritchie and Lewis (2013) stated that in a qualitative study, rich description was achieved when the phenomenon was described in sufficient detail. Aiming for full description of narratives, I evaluated the evidence and drew conclusions that were transferrable. I could be more open about the nature of the influence of the study's affective dimensions by using rich description and thus produced a richer analysis of social and human phenomena.

Rich description was a process I used when describing the details of the interviews. Every minute detail included subtle nuances that were recorded for future analysis (Cooper, Lewis, & Urquhart, 2004). I described the participants' physical and social contexts of their views regarding the phenomenon as well as their intentionality (Schultz & Avital, 2011). Multiple perspectives and meanings were encompassed within the rich description, which was interpreted and transcribed (Sergi & Hallin, 2011).

Trustworthy results. Subsequently, member checking, rich description, member checking, and peer debriefing were all processes that validated information (Golafshani, 2003). I used a qualitative study and apprised the world of a humanistic issue. Therefore, it was crucial that my study contained authentic and genuine data. Using the various methods increased the trustworthiness of the results.

Dependability. In accordance with Turner (2010), dependability and confirmability were substantiated through an auditing of the methods used to analyze data. As the researcher, I established dependable information when the results were reliable because I followed certain protocols and obtained true evidence. Increased dependability of the study was beneficial when constituting that the evidence and results were valid and genuine (Golafshani, 2003).

The objective was to use the processes of verifying collected evidence through triangulation, external audit by peer debriefing, and member checking. Sousa (2014) emphasizes that the dependability and reliability of the conclusive information would be increased in any qualitative study by using those types of processes. I achieved dependability and reliability of the study through a redundancy of the statements, quotes, general feelings, and observations across the participants' experiences during interviews. I obtained and cross-checked information that proved data saturation had occurred and the results were the most reliable and dependable. I achieved validity and reliability through stability, which was established through the data saturation methodology when a specific problem was addressed, and the same results were achieved repeatedly. According to Harvey (2014), data saturation has been achieved when no other method yields a new concept, and thus the information is considered dependable.

Triangulation. Another component of validation was the concept of triangulation. The concept of triangulation has been important in validating information as a significant process in a study (Bjurulf et al., 2012). In previous qualitative research, triangulation has been utilized in conjunction with pluralism, supporting interdisciplinary research, and has been considered to be a type of mixed-methods approach because information had been gathered from various methodologies, such as interviews, surveys, and observation (Oliver-Hoyo & Allen, 2006). In the

qualitative research approach, I intended to use triangulation to produce a deeper understanding of the problem being researched (Olsen, 2004).

Roller and Lavrakas (2015) deemed that the concept of triangulation involved the researcher using multiple sources, methods, and theories to verify that the themes were consistent. The triangulation process was accomplished by compiling evidence recorded from interviews and nonparticipant observation conducted among various educators and two different schools. Those tactics were a form of validating evidence and, as the researcher, I stated clear and concise conclusions regarding the outcome of the study.

According to Golafshani (2003), triangulation could be used in qualitative studies to test and maximize validity and dependability. Those were important concepts found within a qualitative study. Validity was rooted within the positivist tradition, as positive facts supported a phenomenon and results were not based on speculation. McMillian (2012) defined dependability as the extent to which data, data analysis, and conclusions were accurate and trustworthy. Triangulation was the mixing of data or methods so that diverse viewpoints or standpoints were evident in a specific topic (Olsen, 2004).

Reliability. Reliability of the information is equally as important as the authentication of data (Onwuegbuzie & Leech, 2007). When including a group of participants that experienced the same essence or phenomenon in a qualitative study, it was essential that I produced and defended reliable information because the selected participant pool represented a small amount of the population that actually experienced this phenomenon. Selection of articulate participants (Coyne, 1997) that experienced the said phenomenon aided the researcher in increased reliability of the results.

Interpretation and perception were critical concepts when analyzing data (Bogdan & Biklen, 2003). Following Moustakas' (1994) theory that inner perception was dependable and verifiable, the information extracted was dependable because the presentation and the real object existed within the consciousness. This statement meant that by sharing similar experiences and documenting them, educators created a dependability on the value of inner perception. The information gathered was achieved through reflective analysis of the conscious mind (Husserl & Dermot, 2012). According to Luft's (2004) analysis of Husserl, subjective acts led to objective acts of the conscious mind and were verifiable because the data gathered utilized only the conscious mind that had formed specific perceptions. The participants effectively conveyed their perceptions when they articulated their specific experiences.

Expected Findings

Since there was an absence of studies that specifically analyzed educators' experiences and knowledge pertaining to technology integration within interventions for students with HFA, this study was important to all educational stakeholders in American society. Valenzuela et al. (2006) discussed the importance of the involvement of citizens in society for making informed choices regarding educational policy in reference to particular problems. Borgmann (2006) also contented that all members of society has responsibility in caring for one another and encouraged citizens to collectively make sensible decisions for the betterment of the human essence.

As the researcher, I used the qualitative approach and encouraged each participant to examine their consciousness of mind; they provided a distinctive, individualized portion of the problem. I then determined there was a composite and holistic analysis of the information gathered regarding the use of technology within strategies. The multiple perspectives of the participating educators produced a dimensional portrayal of technology integration for students

with HFA or when the IEP team chose to omit technology within IEP intervention strategies for students with HFA.

I utilized the theories by Moustakas (1994) when I closely examined the intentionality of the participants towards the subject. I was assisted by general and special educators who have worked with students with HFA to point the study in a specific direction. Moustakas spoke about the importance of intention,

> There is also agreement that intentionality directs consciousness toward something (real or imaginary, actual, or nonexistent); that the noema gives consciousness its direction toward specific objects. The noema ascribes meaning to what one sees, touches, thinks, or feels. All experience holds within it essential meanings. (1994, pp. 68–69)

Considering Moustakas (1994), I concluded that the intention behind the statements, tone, and nonverbal cues were useful when I further analyzed the data.

Diminished funding for technology. It was expected that the consensus relayed the fact that educators had limited participation in how funds were allocated, dispersed, and spent in each school. Administrative personnel were out of the classroom for the management of a building; consequently, it was difficult for them to effectively disseminate specific funds for generalized allotted purposes within the realm of the interior classroom. Educators expressed their opinions regarding their limited input in the allocation of budget funds for new technology purchases.

I surmised that using two schools in this study was necessary because there were not enough participants in one school. Although one school would have generated conclusive information if there were enough participants, the benefit of having two schools in this study strengthened the authentication of the evidence gathered and reduced possibilities of coincidental

information. Also, each school had a slightly different budget balanced by individual stakeholders.

Title I. Moreover, affecting the expected outcome of this study was that both schools were Title I funded and the building administrators received additional funds to assist educators in bridging the gap between low income students and non-low income students. When any public school in America had a 40% or greater population receiving free or reduced meals, they would qualify for funding granted through the U.S. Department of Education (Malburg, 2015). The additional funds were used for a variety of goods and services, including increased staff. The additional staff members assisted educators in delivering equal access to education regardless of socioeconomic status (Best & Winslow, 2015). The funds were also sometimes allocated for technology depending how the administrators decided to utilize the additional funds.

In addressing the use of each school's budget, a spending pattern was calculated that reflected the available technology in the building. The educators agreed that more funding should have been allotted for increasing available technology. However, unfortunately the educators reported that there was diminished funding for purchasing available technology. The educators discussed the current available technology in their classrooms and buildings. They also provided information regarding how they utilized the available technology.

Difference in clinical settings. There was a distinct gap between quantitative studies regarding the use of technology in interventions within a clinical setting for students with HFA (Schmidt et al., 2011), and qualitative studies that allowed researchers to find an embodied issue within a concept by analyzing the humanistic perspective of the people who actually experienced a certain phenomenon (Smith, 2017). In present and previous quantitative studies, researchers

focused on measuring the success rate of technology use in interventions for individuals of varying ages in clinical settings (Schmidt et al., 2014).

Positive benefits when using technology. Literature reviews confirmed that there was a positive benefit to using technology with students with HFA (Grynszpan et al., 2011). Those quantitative studies were a single component of a larger-scale issue and this qualitative approach elucidated how the educators experienced use of technology, their perceptions when they utilized the technology, the IEP team's reasons for excluding specific technology from a student's IEP, and how diminished availability of technology impacted their ability to deliver intervention strategies and achieve educational equity. In applying concepts, I have gathered from this study, the future development of technology would reflect the paramount veracity of ideas conjectured by the educators.

Ethical Issues in the Study

Researcher bias. As a staff member of a public school system, I had a certain researcher bias towards the topic. In fact, I chose the topic because I wanted to bring attention to an area of critical need—how technology may or may not have been available for use within intervention strategies for students with HFA. My inquiry into technology use had exposed a secondary issue of educational inequity that was directly related to the topic of this study. Educational equity was a crucial concept to all that sought public education (Best & Winslow, 2015). As a unified American society, we must care for one another by immersing ourselves within actions of compassion and empathy (Borgmann, 2006).

Researcher bias within a qualitative study was inevitable (Creswell, 2013). During the conduction of this this study, it would be reasonable to assume that I would have possessed a degree of researcher bias because I have been an educator in both schools within a public school

system, working more than 13 years with many students with ASDs. Consequently, my personal experience was appropriated and used to assist me in the description of a more accurate analysis of the evidence gathered. Objectivity was important for genuine results (Chenail, 2011), and I verified certain aspects of the schools or school system which aided validation of the data, because when educators conveyed their concerns, their statements should hold great value to the community.

My research problem investigated the absence of technology integration within intervention services for students with HFA by understanding how educators utilized the minimally available technology and the reasons why the IEP team chose to exclude technology from a student's IEP. This problem was found to be a serious issue in the public school system. Educational inequity indicates that students were not accessing full curriculum (Valenzuela et al., 2006).), and the absence of daily integrated technology inevitably led to a decrease in educational equity for students with HFA.

Conflict of interest assessment. In agreement with the American Psychological Association, it was important that I carried loyalty and fidelity to the institution in which this study served (APA.org, 2019). As I assessed the conflict of interest, I was able to authenticate the information gathered as evidence because the conflict of interest was low. I did not allow researcher bias to interfere with the integrity of the study.

The study was not based on ideology. My intention in conducting this study was to provide new in-depth insight and breadth to the topic and the way students with HFA received services for their educational needs. The results from this study and the persons participating in this study were not misused for the researcher's personal gain. The APA Practice Organization Policy on Conflict of Interest and Confidentiality (2002) states,

> A conflict of interest shall exist when a covered individual uses his or her relationship with the Committee for the Advancement of Professional Practice or the APA Practice Organization, or information received as a result of his or her relationship with either entity, for private gain or for the benefit of a third party, including another non-profit organization. (p. 1)

As the researcher, I preserved the integrity of the study by protecting the interests from outside ideology groups. If an opportunity had arisen where a specific group wanted to capitalize on my conclusions, I would have denied permission for that group to use them.

Researcher's position. As the primary researcher, my position was the principal investigator. I conducted interviews with participants and transcribed their statements into collections of data. The transcripts were analyzed and coded per redundancy of information (Fereday & Muir-Cochrane, 2006).

For protection of the integrity of the project, I utilized member checking, a process in which the participants reviewed the transcripts and coded information. I used this procedure to verify accurate statements and participants were allowed to clarify quotes or expand their thoughts (Birt et al., 2016). Furthermore, as the researcher, it was my responsibility to provide the academic community with genuine information in the form of rich description (Sergi & Hallin, 2011) that included their explanations regarding certain noted idiosyncrasies.

Ethical issues in the study. When a researcher allows bias to influence the outcome of the study, the results cannot be considered genuine, but when the researcher uses their bias to further investigate the phenomenon in an objective manner, the information can be useful (Chenail, 2011). Since I had a unique position as the sole investigator as well as a current general educator within a public school system, I possessed researcher bias that favored the side of the

educators, but used that to evaluate the participants' statements. Understanding the fiscal restraints in the system, the budgeting issues, and enormous population that the school system served, I provided critical insight into the plausible available technology within the county. Having been housed within three different schools in three separate regions of a county, I provided information that aided in widening the scope of accurate budget reporting.

I had researcher bias due to my direct involvement in this subject area, investigation of the use of the minimally available technology within intervention strategies for students with HFA. The secondary issue of educational inequity was revealed when I investigated the technology use during interventions for students with HFA. As an educator invested in the effort to minimize educational inequality and reach all diverse learners, I needed to honor ethical issues in my proposed study. The intentionality with which I moved forward in this study maintained a strict adherence to ethical guidelines. The APA (2002) stated,

> Psychologists strive to benefit those with whom they work and take care to do no harm. In their professional actions, psychologists seek to safeguard the welfare and rights of those with whom they interact professionally and other affected persons, and the welfare of animal subjects of research . . . Because psychologists' scientific and professional judgments and actions may affect the lives of others, they are alert to and guard against personal, financial, social, organizational, or political factors that might lead to misuse of their influence. (p. 3)

Thus, my intentions were to bring light to the serious issue of the minimum available technology for integration within intervention strategies for students with HFA. As an active educator in the field, I possessed a certain bias towards the subject due to exposure from working with students with HFA. My level of personal involvement was evident as the researcher and my past, present,

and projected future involvement as a stakeholder. This was called clarifying the researcher bias (Stake, 2010).

I applied a philosophically based qualitative research approach (Levy, 2006). Philosophy was described as the use of abstract ideas and beliefs that informed researchers (Turner, 2010). Since the phenomenological approach was philosophically based, it was important to understand that the participants provided personal experiences that generated abstract concepts (Smith, 2017). Philosophically, my preconceived notions and personal experience as an educator of primary-aged to college-aged students possibly impacted the analysis of the concepts. However, I aimed to open my mind to ideas and notions without any presumptions and used this strategy to be more objective when I gathered, interpreted, and generalized data into major themes (Fereday & Muir-Cochrane, 2006).

Qualitative studies also incorporated psychology (Cohen & Crabtree, 2006), which was closely related as the discipline that achieved the reconstitution and improvement of the human condition by the scientific study of the behavior of individuals and their mental processes (APA.org, 2019). Considering that researchers of phenomenology mandated a multi-faceted approach to examining perspectives from all angles, the human condition of all the participants was at stake (Roller & Lavrakas, 2015). Strict devotion to the psychological protection of those involved ensured ethics codes and regulations are followed (APA.org, 2019).

Due to the sensitive nature of the study, all participants were chosen in accordance with their qualifications, experience, and exposure to educational interaction with students with HFA. The educators were trained in serving the needs of students with disabilities. They were certified in special education services or had taken specific courses to meet the needs of resource students, such as those with HFA.

There were four basic steps when including human participants in a qualitative study (Richie & Lewis, 2014). First, the study was explained to the prospective participants verbally in full detail, including the purpose, procedures, evidence collection tools, protocol, purpose, publicity, length, and intentionality. Next, those individuals that participated signed a consent form that granted permission to use their statements, quotes, and personal notions related to the topic area (see Appendix B). Then, participants' statements, quotes, and ideas were categorized into corresponding themes and coded for use in verification of the existence of the said phenomenon (Bogdan & Biklen, 2003). The final step was inclusion of information gathered from all statements, quotes, and personal experiences within the dissertation (Ritchie & Lewis, 2013).

Therefore, I implicitly adhered to the regulations set forth in the guidelines to efficaciously conduct a valid study. Conscientious researchers avoided conflict of interest. This act protected the participants and the group of students they represent (APA, 2002).

Chapter 3 Summary

Chapter 3 was important because I explained the purpose and reasons for conducting the investigation. The purpose of the study was to investigate the problem, the minimally available technology for integration within interventions for students with HFA in the public school system. Integration of technology within evidence-based intervention strategies was difficult to administer with limited assistive technology. In addition, I explained the procedures in detail and ensured that the results were verifiable and valid when I utilized the proper procedures to conduct the study.

Educators were the main participants in the study. They relayed their personal and professional experiences when they administered interventions with the minimally available

technology for integration. They also recounted their decisions as part of the IEP team to refrain from including specific technology from a student's IEP. In this study, I closely examined the daily personal and professional experiences of the educators who work with students with HFA.

The study was conducted and investigated within a public school system. My research procedures utilized a phenomenological approach with interviews as the essential component in data collection (Ritchie & Lewis, 2013). Evidence was collected and examined (Fereday & Muir- Cochrane, 2006) and I coded each theme after careful analysis of all minute details.

The projected outcome of the study was aimed at creating societal awareness for this issue. Educators provided a voice for those that were silent and underserved. A partisanship from educators elicited a positive change in the format in which intervention services were delivered to students with HFA in the public school system. The intentions of the study were to procure positive change for students with HFA.

In conclusion, Chapter 3 contained the methodology I completed. I have elucidated the methods utilized in conducting the study and implicit reasons for employing specific techniques. Utilizing a phenomenological approach, I strictly adhered to APA guidelines to protect the participants in the study.

Chapter 4: Data Analysis and Results

As stated in Chapter 1, as of 2019, 3.5 million people are living with a type of autism in the United States (Autism Society, 2019); therefore, we must critically analyze the services rendered to students with HFA, who are enrolled in the public school system. Students with HFA have demonstrated a propensity towards using technology (Kandalaft et al., 2012). Accordingly, administrators must understand how educators experience the use of technology and technological aids during the intervention process for students with HFA. Evidence-based practices are necessary when providing resource services to students with HFA (McCleery, 2015). Close examination of practices and accommodations are important because the administrators can adjust the master schedule to incorporate specific student needs, such as a block of instructional time in the computer lab in order to access technology.

Introduction

In this study, I delved into the personal experiences that selected general and special education teachers reported regarding the phenomenon of utilizing technology within interventions for students with HFA. However, in an IEP, a student with HFA must be labeled with the general Autism code, due to Federal Education Regulations (Maryland Online IEP, 2019), and the special education chair must include evidence-based practices within the IEP.

According to the National Professional Development Center, as part of the National Clearinghouse on Autism Evidence and Practice (NCAEP), there were 27 different practices that students with Autism would have benefited from (The National Professional Development Center on Autism Spectrum Disorder, 2019). Evidence-based practices are instructional methods that have been proven by research and analysis to be beneficial to students with ASDs, including HFA (Donaldson & Zager, 2010). The most common evidence-based practices included within a

student's IEP were: Visual Supports (VS), Modeling (MD) Social Skills Training (SST; often provided by the professional school counselor), and Peer-mediated Instruction and Intervention (PMII). Some of the least commonly included practices were specifically technology based, such as, Technology-aided Instruction and Intervention (TAII) and Video Modeling (VM) (Participant 12).

In this chapter, I will begin with a statement of the problem and its purpose, restate the research questions, and present a description of my role as the researcher. The description of the sample and research methodology section is provided to give an overview of the research design. In the research methodology and analysis section, I detail how the method was specifically utilized within this study. In the summary of findings and presentation of the data and results, there are six themes, which are depicted using rich description.

Statement of the problem. With the increase in autism spectrum diagnoses each year (Center for Disease Center, 2019), educators in the public school system must meet the students' needs. Practices may include the use of technology. The intervention strategies may include specific instructional aids, such as electronic devices with an app for communication (U.S. Department of Education, 2019).

Therefore, it is ideal to keep abreast of the newest strategies and techniques so that educators may address the specific learning needs of students with HFA. Research has shown that technology, inclusive of electronic devices and other technological aids, would assist in delivering services to students with HFA (Litvinov, 2018). However, it is the norm that evidence-based practices that are not technology specific and can be interpretive according to the materials available to the educator are included in the student's IEP. Thus, if a student has Modeling (MD) and Visual Supports (VS) as an accommodation, the educator can use

technology if it is available. Otherwise, they may use picture cards, anchor charts, and graphic organizers to assist the students; thus, the educators comply with the student's IEP. The debate remains whether technology is more beneficial when providing these accommodations to students with HFA (Sabella & Hart, 2014). Educators in the field tend to favor the use of technology when implementing Modeling (MD) and Visual Supports (VS) (Participant 14).

Research questions. In this study, I investigated two research questions: How do general and special educators experience technology while providing intervention services to students with HFA; and what factors are IEP team committee members considering when they decide to include or refrain from adding technology accommodations within an IEP for students with HFA? Directly speaking with educational professionals provided me with valuable insight into how technology was integrated in intervention services for students with HFA. I also learned different reasons behind the decision to exclude technology use when creating a student's IEP.

Role as the researcher. I conducted this study using a phenomenological research design and the data was collected from in-depth interviews with selected educators working in general and special education. Since this study involved human subject participation, experiences that the educators provided were similar but never identical. Therefore, I used code words to group similar ideas and experiences (Saldaña, 2009). My goal was not to clarify ambiguous statements with a researcher's interpretation, but rather to reread the information as presented and categorize data into units for coding (Vagel, 2018).

Preconceived notions. When I started this study, before conducting interviews or collecting data, I possessed some preconceived notions regarding the expected results. These expectations did not function as priori criteria that might have altered resulting data, because research questions were not created according to the predictions (Vagel, 2018). Instead, I used

the results to examine the data. I predicted that most educators would favor the use of technology because they had positive experiences during the implementation of interventions for students with HFA. Additionally, I anticipated that many educators would assert that there is outdated or minimally available technology available at their school due to funding issues, leading to a complicated conversation about technology use in a student's IEP and how to include technology and technological aids. Finally, I expected that the educators would report that utilizing technology increased educational equity in the public school sector for students with HFA. Each of these predictions proved to be correct.

Description of the Sample

In a qualitative study, the relevance of candidates in the sample is more important than the sheer number of people that participate. Specifically choosing those who have experienced the phenomenon (Merriam & Tisdell, 2015) is pertinent in validating data. Purposeful sampling indicates the researcher chooses their participants based on specific criteria because the researcher feels the participant will contribute knowledge about the studied central phenomenon that will add depth to the study's findings (Creswell, 2013).

When conducting a phenomenological study, the sample size is significantly smaller than a quantitative study. As the name indicates, qualitative refers to the quality of information provided by various methods. The objective of a qualitative study is not derived from using the information to generalize a theory (Bound, 2011). The interviews are detailed accounts of how the participants experience the central phenomenon. Therefore, the range of sample sizes in qualitative studies is typically 18–20 participants (Merriam & Tisdell, 2015).

Target sample. The educators varied in experience, gender, age, race, ethnicity, religion, type of certification, educational background, and time spent teaching in the specific county. I

wanted to expand the scope as far as possible without impacting the results of the study. The demographics of the educators were not the focus of the study.

In this study, the 19 participants provided enough similar statements, information, thoughts, and ideas in which I was able to attain data saturation. Data saturation is important because it is the concept that no new information was revealed and redundancy was achieved (Fusch & Ness, 2015). The sampling population consisted of general and special education teachers who had to be assigned or have worked within two specific Title 1 schools within a county in Maryland.

As a state requirement for public school teaching, each educator held either an advanced professional certificate (APC) or a standard professional certificate (SPC). In addition to being certified to work as public-school teachers within Maryland, the selected educators would be required to have experience in teaching, working with, or co-teaching students with HFA. I did not require the educators to meet a criterion of working with a certain number of students with HFA because I was primarily interested in examining their personal experiences while using available technology in the context of intervention strategies. Therefore, experiences of educators who had worked with even a single student with HFA were relevant to this study.

I have eliminated the possibility of the respondents' demographics as an invariant meaning of the sample structure. The educators were chosen as they had worked with students with HFA. Moreover, the educator would have used a type of technology during intervention strategies.

Research Methodology and Analysis

The phenomenological approach is especially valuable when investigating the dynamics of the educational field. Therefore, Kozleski (2017) states, "qualitative research is particularly

well suited to the study of educational treatments which are situated and dynamically interactive" (p. 22). In my study, I investigated how educators experienced the use of technological strategies in interventions for students with HFA. The interventions were used as a type of treatment and the students were rendered services in or out of the classroom, as the IEP dictated, depending on the targeted skill(s) of the lesson.

According to Chapter 1, for the purposes of this study, the term technology was used to describe electronic devices such as Chromebooks, computers, iPads, and Smart Boards (Lachapelle et al., 2018). Assistive technology referred to any item that was necessary to maintain or improve functional capabilities for devices from wheelchairs to technological programs that included speech-to-text programs or other high-tech software (Bodine, 2003). Both technology as a whole and assistive technology was considered when writing, reassessing, and implementing an IEP for a student with HFA.

Research methodology. There were certain components that were integral to completing a genuine phenomenological research study. The results needed to be verified by an academic method such as data saturation and triangulation. It was critical to prove that the evidence collected was authentic.

Triangulation. Triangulation is a process used by the researcher to ensure that the results collected can be verified as true. Triangulation can only be used if multiple methods of data collection have been used by a researcher (Olsen, 2004). In my original methodology section, I stated that I would use triangulation to verify my results. However, I was unable to use triangulation because I only used interviews to gather data. I did not use another process, such as non-participant or participant observation. If I had been able to use either of these techniques, I

would have generated field notes. With the available field notes, I would have cross-checked the information gathered through the interviews (Cooper et al., 2004).

Data saturation. Data saturation is a process used to verify that my information was valid and reliable by analyzing the transcripts for redundancy. By finding repetitive statements and concepts, I was able to justify that the phenomenon (Fusch & Ness, 2015) had occurred among the educators. Through the similar and repetitive statements of the 19 participants, I detected enough redundancy to competently declare that my conclusive results were authenticated.

Research analysis. The research design utilized in this study was consistent with a phenomenological approach. The instrumentation used was guiding questions for an in-depth interview with each participant (Seidman, 2013). The data collection was completed by recording and transcribing interviews.

Using Husserl, I explored the use of essence in phenomenology, discovering what was significant in the study. I also used three of the four steps of the phenomenological reductionism process: bracketing, horizontaling, and clustering (Vagel, 2018). These steps were important in analyzing the responses from the participants.

Bracketing. Bracketing, the first step of Husserl's phenomenological research design, is a process used to produce phenomenological reduction or epoche. It is used in descriptive phenomenology where the researcher brackets their own judgments and pre-understandings of the surrounding world as a philosophical practice (Vagle, 2018). Essentially, the purpose of bracketing is to view the phenomenon from a fresh perspective in order to closely examine the data without prejudice or a priori criteria (Luft, 2004). Use of technology in the classroom has many different uses (Barton, Pustejovsky, Maggin, & Reichow, 2017). Accordingly, I bracketed

the relevant topic and question, which pertained to the central phenomenon regarding how educators plan with and utilize technology during interventions for students with HFA.

Horizontalizing. The next part of the reduction process was horizontaling to ensure that all the statements had equal value (Luft, 2004). I used this concept to understand the meaning of the data based on the information. In a qualitative study, transcripts should be read first, then reread numerous times to closely examine the data (Vagle, 2018), therefore I completed that part of the process to achieve horizontaling. The transcriptions were then reduced into segments or workable units (Saldaña, 2009). Upon examination, I did not attempt to clarify ambiguous ideas. I continued to separate the data into more meaning units until the transcript was transformed into a holistic overtone of the participant's natural attitude and expressions.

The information was obtained by recording and transcribing interviews (Merriam & Tisdell, 2015) with educators who have worked with students with HFA. Having already prepared an interview protocol of guiding questions, I used these to facilitate an in-depth conversation with each participant. Seidman (2013) suggested the inclusion of non-leading techniques, such as keeping the body neutrally still with intact eye contact and remaining quiet. When interviewing my participants, I practiced those techniques as the educators relayed their experiences and thoughts. I also avoided crossing my arms or using hand gestures to speak or elicit answers from the educators as they spoke.

To ensure accuracy, I meticulously scrutinized and analyzed information in the transcripts, carefully listened to more than 19 hours of interviews, and handwrote each participant's statements. Then I organized the information into a transcript for the participants to reread and check for accuracy, called member checking. Carlson (2010) stated that member checking will increase the validity of the information gathered during an interview.

Clustering. Since the interviews were framed around guided questions, structural coding was the most appropriate coding technique (Saldaña, 2009). Therefore, clustering the horizons around themes, I used structural coding to determine relevant themes by which to organize the data. According to Saldaña (2009) structural coding is most appropriate for qualitative studies where the data is collected from interviews, "content-based or conceptual phrase representing a topic of inquiry to a segment of data that relates to a specific research question used to frame the interview" (Saldaña, 2009, p. 72). Structural coding is used by the researcher as a categorization technique in which segments of similar information are identified across a broader sample. The segments are then separated into smaller, more specific workable units (Saldaña, 2009). Ideally, but not always, a theme will emerge as the transcripts are reread and segments are categorized and re-categorized into more precise member units (Vagle, 2018).

While using dedoose.com, I discovered that each statement needed to be condensed into one or two keywords. The algorithmic program calculated percentages based on the repetition of exact keywords. Accordingly, the software program was ineffective at recognizing similar thought patterns. Having discovered this, I had to repeat my analysis of the information by detecting the thought patterns and grouping them into a category that would produce results from dedoose.com. However, I deviated from my original analysis procedure after I realized that an algorithmic coding program only analyzes data in a straightforward manner. When reading the interview transcripts, I felt that using dedoose.com as the sole means of analysis would inhibit my deeper understanding of the data by missing patterns that were not identical to the keyword. Consequently, using Vagle's (2018) guidelines, I decided to physically study the transcripts and break them into smaller units of meaning that produced more accurate codes.

The tactile process involved charts, tally marks, post-it notes, and lined paper. First, I re-read the transcripts three times, then created charts to find patterns in the participants' responses to each question. I created 10 separate charts, two for my guiding questions and eight for my subsequent follow-up questions, procuring key concepts from each of the subjects' responses. To create these separate charts, I placed a single question at the top of each sheet.

Then I reread the transcripts of each interview again and focused on the single question. I used post-it notes and scraps of paper to handwrite important statements and main ideas. By placing segments and summaries of all the responses together, organized around a single question, I had a more comprehensive view of the data. Finding the repetition of similar words, phrases, and ideas became easier when I used this method.

Finally, after placing responses under the correct code words, the overall thought patterns of the respondents became easier to identify. In my qualitative study, themes emerged after a type of coding method when I applied the structural coding technique. "Structural coding applies a content-based or conceptual theme representing a topic inquiry to segments of data that relates to a specific research question used to frame the interview" (MacQueen, McLellan-Lemal, Bartholomew, & Milstein, 2008, p. 124).

Summary of the Findings

My research questions were as follows: how did special and general educators experience technology during intervention strategies for their students with HFA and what factors are IEP team committee members considering when they decide to include or refrain from adding technology accommodations within an IEP for students with HFA?

In order to provide further guidance during the interviews, I created open-ended probing questions (see Appendix A). These questions were designed to elicit deeper thought into the

subject matter and encourage the educators to speak freely regarding the topic (Merriam & Tisdell, 2015). After analyzing the interview transcripts and dividing segmented statements into workable units (Saldaña, 2009), I observed that themes began to emerge, such as the use of technology in the classroom that increased student engagement.

There were six overall themes that I identified from the data. These themes were evident after careful analysis of the interview transcripts. It was necessary to separate similar notions into different themes due to the complexity of the issue.

Theme one: Technology increased student engagement. When the student's IEP dictated that the individual would receive Modeling (MD) or Visual Supports (VS) as an accommodation, educators used technology and technological aids as often as possible. Consequently, they found that students with HFA paid more attention to lessons when those lessons used some type of technology. Some examples of electronic visual supports included video clips showing a certain skill or concept, as well as the incorporation of educational songs accessed through an iPod or the internet. Static photographs researched online was another technological way that students accessed information to assist them when deciphering certain vocabulary words or terms. If a student with HFA did not understand the written definition of the word "gleam", they were able to find pictures of a gleaming object by using the desktop computer or laptop. Modeling (MD) and Visual Supports (VS) was part of their IEP accommodation and use of technology was an appropriate way for educators to deliver the evidence-based practice when technology was accessible to students with HFA.

Educators felt that, when integrated into instructional strategies, the use of technology yielded a greater amount of increased engagement. "It makes my high functioning autistic students pay attention more because the animations capture their attention" (Participant 3). "My

students with HFA enjoy using technology more and it seems to keep them actively learning compared to paper and pencil" (Participant 4). Both general and special educators continued to describe that regular education students often requested that they'd rather take important tests on paper than on the computer.

> One of my students complained during a math benchmark that they could not adequately focus on their math test using the computer and found it nearly impossible to recreate their equations using a keyboard when they wanted to show the process using arrows and columns. My student with HFA disagreed and stated that he preferred the test in computer format. He said it was easier for him to type and he like the format better. (Participant 16)

These types of recurrent statements led to the development of this theme.

Theme two: Use of technology for differentiation within interventions. An evidence-based practice for students with HFA included the Technology-aided Instruction and Intervention (TAII) as the central feature for support of the acquisition of the learner as well as Video Modeling (National Professional Development Center on Autism Spectrum Disorder, 2019). Even if the two evidence-based practices were not specifically dictated in the student's IEP, educators used technology to satisfy the Visual Supports (VS) accommodation. For example, one educator reinforced independent work, including tests, by providing specific video clips from math antics as a Visual Supports (VS) accommodation. She believed this method, "helped to level the playing field" (Participant 14). These types of short instructional video clips can be accessed on YouTube, learnzillion.com, safari montage, study island, and iReady and are considered part of CAT. Ploog, Scharf, Nelson, and Brooks (2013) conducted studies regarding the effectiveness of CAT when used with children with ASDs, including individuals with HFA.

The main objective of this study was to address the fact that, according to research, children with ASDs, including HFA, had an affinity to computers (Finknauer et al., 2012). Thus, the use of computer technology was an effective and efficient tool for treatment when properly implemented. The assistive technology was used by professionals to address the core deficits in social and language skills and retention of knowledge (Ploog et al., 2013).

Theme three: Technology increased educational equity. The educators reported that although Technology-aided Instruction and Intervention (TAII) was a specific evidence-based practice for students with HFA, this practice was often not included in a student's IEP. Yet, when technology was used in instructional strategies for students with HFA, educators felt they had a varied means that addressed student needs. "Technology can help bridge the gap between HFA and other students in the classroom as HFA students typically feel more comfortable with devices in hand" (Participant 7).

Educators attested that use of technology was more effective for maintaining and reaching their students with HFA. They used technology for the evidence-based practice of Prompting (PP) as well as Response Interruption and Redirection (RIR). Students would be redirected by use of a software program that included prompts to complete tasks. The general and special educators had prior experience working with students with HFA and provided their students with multiple strategies and intervention tools to equalize education.

> I have used various tools provided for me by the school and some I have even purchased myself. Since students with HFA have difficulty with expressive language and some working memory issues, I find that the use of electronic devices assists me when working with them during small group. I might utilize a typing program to reinforce building language skills and communication. I feel that if a student can adequately communicate

in written or oral form, then they can advocate for their educational needs. Only then will their educational equity increase. (Participant 3)

Theme four: Use of technology increased the ability to access ToM. ToM, or Theory of Mind is vital in communicating, collaborating, and existing with others in society. Cognitive Behavioral Intervention (CBI) is an evidence-based practice corresponding with ToM, in which students with HFA learn to examine their own thoughts and emotions in an attempt to recognize when negative thoughts begin to escalate in intensity and use strategies to change their thinking and behavior and impact on others (National Professional Development Center on Autism Spectrum Disorder, 2019). An increase in the implementation of ToM may be valuable in narrowing the gap between individuals with ASD and their nondisabled peers (Rice et al., 2015). Educators discussed that they felt their students with HFA were able to access their ability to collaborate and cooperate at an increased level with the use of technology during small group interventions.

When given a choice for their type of collaboration projects, students with HFA tended to choose a shared digital platform. This practice was considered an Antecedent-based Intervention (ABI) because the learning environment was altered prior to student use in an attempt to increase engagement and decrease undesirable behavior, such as refusal to work alongside other students without electronic devices (National Professional Development Center on Autism Spectrum Disorders, 2019).

> Whenever I require my students to work in pairs, my students with HFA always groan and ask if they can work alone. After I tell them that they must work with someone, they choose to use a digital platform, such as a shared slideshow project. Once, I asked my student why he chose a digital project, he said it was easier to talk to the other person and

work with them. Also, he stated that completing the project electronically was more interesting and made he and his partner happier. (Participant 2)

Students with HFA have also had one to three additional evidence-based practices added to their IEP. These practices were self-management, Social Skill Training (SST), and Peer-mediated Instruction and Intervention (PMII), in which the counselor was responsible for assisting in implementing the strategies to the student. One or all three practices may be listed in the student's IEP because they coalesce with one another, since students with HFA must learn how to work with non-disabled peers, manage their own behaviors, and engage in appropriate social skills in the classroom (National Professional Development Center on Autism Spectrum Disorder, 2019).

Theme five: The IEP team chose not to include specific technology in a student's IEP. According to Maryland state law and federal education regulations, the special education chair may only use the terminology of evidence-based or research-based practices. Therefore, the IEP team cannot include a specific technology or technological aid in the IEP and may only list research or evidence-based practices (Maryland IEP Online, 2019). The only two technology-specific practices listed by the National Clearinghouse on Autism Evidence and Practice (NCAEP) are Technology-aided Instruction and Intervention (TAII) and Video Modeling (VM; National Professional Development Centers on Autism Spectrum Disorders, 2019).

Educators have been hesitant to list those as definitive accommodations because general and special educators would be required to provide technology even if the devices were unavailable. Moreover, some educators declared that educators needed to personally interact while providing intervention strategies to students with HFA; technology use may have inhibited that process. Instead, the IEP team chose to set a goal with the use of an intervention that was

flexible as the special or general educator deemed fit to accomplish the student's IEP goal. An IEP team member provided her input,

> I think that technology cannot be the sole type of IEP intervention that is used by teachers to help their students with HFA. Students with HFA need to have opportunities for face to face educational interventions as well, that helps improve social and verbal skills. (Participant 1)

The type of evidence-based practice might have included Visual Supports (VS) because educators could choose to incorporate technology within that practice and remain in compliance with the IEP requirements.

Theme six: HFA students without an IEP did not consistently receive technology. Even though a student has been identified with HFA, that does not indicate they automatically qualify for an IEP. An IEP is developed for students adversely impacted by regular education and cannot be successful without accommodations, adaptations, modifications, and resource services. These services are more intense than the differentiations provided by the general educator. The students that do not require an IEP can function in the general education classroom without major accommodations. However, they still need differentiation to be successful.

All students learn in different ways. Therefore, the general educators aimed to meet those needs by providing small group instruction, assistive aids, and available technology. General educators attested that there were three major factors that impeded them in effectively utilizing technology for their non-IEP HFA students: school budget constraints, lack of technology training, and difficulty incorporating technology into instructional plans.

Budget constraints. Educators felt that budget constraints decreased the availability of technology in the classroom because electronic devices were not refreshed, and the software was

not current. Allocated funding was problematic for upgrading or purchasing software since the school budget committee had specific parameters for fiscal spending. As a school required many resources to run efficiently, educators felt that renewal of technological devices and software was not a top priority in their school.

Reduced training. Educators felt that there was reduced training for the technological interventions they used with their students with HFA. When educators were presented with a new system, software program, electronic platform, or device, training was not always adequate. Instead, there was an introduction and a quick professional development. The main issue was that educators received a "crash course in the new technology" (Participant 15), mostly without follow-up instruction or assistance. A common complaint revealed that educators were not efficient in utilizing the various applications of software programs.

Difficult to include in planning. Educators claimed that technology was difficult to incorporate into instructional plans. When providing effective interventions for students with HFA, general educators felt that they needed to incorporate any available technology within their lessons. However, there were no guarantees that there would be technology would be available, so the educators felt that it was their duty to create two separate plans, one including technology and one that did not. The educators expressed their frustration at having to double plan because they did not have extra time in their daily schedules. Yet, they felt that not including technology was a disservice to their students with HFA and still continued to create plans that included electronic devices and software use, as well as plans that did not include any technology.

Presentation of Data and Results

After careful analysis of the data, I discovered six distinctive themes. These major ideas have not been combined. Special and general educators have definitive experiences and ideas regarding the topic of each theme.

Theme one: Technology increased student engagement. This theme was immediately evident after conducting several interviews. The commonality among all transcripts from the interviews was that educators favored technology because they believed that the incorporation of technology in the classroom increased engagement among their students, especially students with HFA, given past and present research. Odom et al. (2015) conducted a study that found that students with ASD, including HFA, preferred to engage with technology due to the predictability and reliability of the digital format.

Visual supports and modeling. Some students' IEPs included accommodations such as Visual Supports (VS) or Modeling (MD). Those were specific to students with ASD (National Professional Development Centers on Autism Spectrum disorders, 2019) and were relevant to the study, as the educators spoke about their experiences with students with HFA, a part of the ASD spectrum. The accommodations did not specify that technology should be at the forefront when integrating the practices within interventions. However, the educators used technology and technological aids when devices were available for implementation of Visual Supports (VS) and Modeling (MD) accommodations.

When special educators used the available technology as Visual Supports (VS) and for Modeling (MD), they felt that the interactive components were paramount to capturing the attention of their students with HFA. Students applied their knowledge and tested skill levels when offered a software program that was interesting to them.

> It's difficult to initially engage my students with HFA to accept that we will be learning a new concept in class, therefore, I start my intervention by allowing them to play an electronic game to introduce the skill. My students with HFA enjoy playing math games on the computer because they have fun and don't even realize they are practicing their math skills. (Participant 6)

Respectively, student engagement increased.

Another participant exclaimed that the interactive program designs were especially useful due to the targeted concepts based on embedded needs assessments (Participant 2). Her statement indicated that educators were able to analyze data and chose interesting interactive specialized software programs designed to increase knowledge retention for her students with HFA. She utilized this program solely for her IEP students with HFA, because it was a special license purchased by the school for their intervention services and was acceptable because the interactive program modeled concepts and provided the students with visual supports.

The traditional classroom of paper and pencil may not be quite as widely implemented as it once was. Yet, it is still vital for students to learn how to write and spell correctly. Therefore, the English Language Arts classes in those elementary schools still used Visual Supports (VS) such as graphic organizers as well as paper and pencil.

Special and general educators found that some of their students with HFA were challenged in the form of written expression. Thus, when they were assigned a writing task, they were not able to write the words as quickly as they said them out loud. While the remaining students used pencil and paper, Special and general educators allowed their students with HFA to utilize technology, to access an interactive writing program, such as speech-to-text, which was

effective in engaging students in the task. “My students with HFA enjoy using technology more and it seems to keep them actively learning compared with pencil and paper” (Participant 4).

Technically, this accommodation would have been listed in their IEP as Technology-aided Instruction Intervention (TAII), yet unfortunately, most students with HFA do not receive this formal accommodation listed as a requirement. Therefore, educators can implement the proper accommodation of Visual Supports (VS) because the program will type out the words for the student, thus providing a visual representation of their thoughts. This is the reason many educators found that they had to become creative when integrating technology within their interventions whenever the devices or programs were available to them. They felt that the interactive technology was more effective than providing their students with only writing samples or sentence starters for the Visual Supports (VS) or Modeling (MD) accommodations.

Still pertaining to Visual Supports (VS), even when a program was not interactive, the colors, music, graphics, and visuals stimulated learning within the student. Previous research determined that when educators used video clips to reinforce a taught skill, students were better able to self-correct (Donaldson & Zager, 2010). The participants in my study discovered that their students were also more apt to self-correct when provided a model through a video clip. For example, when a specific math skill was taught in small groups to students with HFA, many students did not immediately remember it. Nonetheless, using a video clip on YouTube, the students followed the visual instructions step-by-step and applied it to their math problem (Participant 8). The video clip provided the student with Modeling (MD) and Visual Supports (VS), without Video Modeling (VM) listed within the document as accommodations to students with HFA who possessed an IEP.

Technological aids. One educator was personally and professionally connected to teaching children with HFA. Although the individual was not quite school-aged, the educator reported that using technology with her young nephew captured his attention immediately. She used songs and digital videos and taught him vocabulary words. “Even though he still does not speak, he can give me short bursts of pointing to a cat, for example, on the screen with other animals when I say ‘cat, where is the cat?” (Participant 16). The rest of the narrated video announced the type of animal and recreated the sounds they made. This was important when her nephew identified multiple types of animals.

Special and general educators reported that their students with HFA became engaged within a task or skill in which they used technology as a tool and reached their goals.

> One of my students with HFA, named Aiden, functioned in the classroom with accommodations to his work and the classroom setting (per his IEP). He would use his laptop to type out answers to warm up questions and other assignments, while the rest of the class wrote the answers in their journals. He no longer put his head down on the desk, refusing to answer the questions. Instead, he was excited to use his laptop to type his answers, and would proudly show everyone his work. (Participant 8)

The educator reported that Aiden’s participation increased over the course of the year and he volunteered to read his answers to the warm-up questions. Aiden had Technology-aided Intervention Instruction (TAII) in his IEP. His parents volunteered to provide their son with a computer that they personally purchased. The school was required to furnish the student with an electronic device to complete his assignments in this manner; however, the parents felt that they could give him a more reliable digital device.

Since autism has been classified as a developmental delay affecting social behavior, speech, and communication, (CDC, 2018), students with HFA experienced difficulty in expressing their thoughts.

> Technology is extremely vital to the success of students with HFA. Interventions that are technology based are captivating to students with HFA because of the way they think . . . Technology offers an array of interventions that challenges students with HFA in a way that paper and pen cannot offer. (Participant 9)

This educator used technology as much as possible when providing interventions for his students with HFA. He reported an increase in engagement and involvement during the instructional practices.

Yet, if a student did not have TAII as a specific accommodation, educators justified using technology as part of listed accommodations within the IEP. Some evidence-based practices they administered using technology, such as Response Interruption and Redirection (RIR), in order to eliminate disruptive behaviors. Unfortunately, if the technology were unavailable to the educator at the time, he/she would have to use traditional methods to redirect their students to remain compliant with their IEP.

Still, another educator reported that her students with HFA had responded well when they completed technology-related activities. “In my experience, they are more focused and responsive due to colors, light, animation, and it does not require them to be socially interactive” (Participant 10). Another educator stated that she used technology as an accessibility tool that kept work interesting. Her students with HFA preferred to type an assignment rather than write it out on paper. She stated that so long as the assignment was completed and the student was fully engaged, she accepted it in electronic form (Participant 11). The other students in the class were

required to write in their journals. Again, if the student did not have the TAII as an accommodation within their IEP, the educator would not be mandated to use an electronic program to increase the engagement of her students with HFA. When the technology was available, she advocated that the use of the computer was part of an Antecedent-based Intervention (ABI), modification of the environment for the student, or Discrete Trial Training (DTT), in which she directed her student and repeated the skill of written language.

In support of continued use of technology integration, one special education teacher pointed out that the world is now centered on technology. She stated that students were more engaged and participated in self-monitoring of their learning progress and goals. The immediate feedback was helpful and kept students interested in improving their scores (Participant 18). However, if it was not specifically included in the IEP, the school did not have to provide the electronic device, software program, or technological aids, as dictated within the IEP.

Theme two: Use of technology for differentiation within interventions. Educators use the term "differentiation" to alter instructional material to fit the needs of the diverse learner. For students with HFA, differentiation is a pertinent part of meeting their goals and academic needs as set forth in their IEP. Thus, differentiation may include presentation of materials in a different format or of modified content accessible to specific students with individualized needs (U.S. Department of Education, 2019). TAII and video modeling (VM) would guarantee a student access to the electronic format of instruction with educator support if the accommodations are listed in the IEP (National Professional Development on Autism Spectrum Disorders, 2019).

Integration. Participants identified the integration of technology within instructional practices as an important part of providing students with differentiated material. "Integration of technology within intervention strategies is an important aspect for students with HFA because it

opens the door for different possible teaching methods, and assessment methods" (Participant 11). The educator found that in order to differentiate effectively and efficiently, she needed to use technology to address students with HFA. She modified assignments or provided digital assignments to students with HFA. In fact, her students with HFA completed their entire science fair project using technology and created a presentation that included animation, video, digital pictures, and Excel charts. They did not have TAII listed in their IEP, therefore she rationalized the use of technology as VS, MD, and PP and increased student success. However, she had to share the computers with the Reading teacher and, therefore, her students with HFA were not guaranteed an electronic device. When she was in possession of the devices, she ensured that her students with HFA received their own Chromebooks so they could complete the project digitally.

Educators could set up programs specifically tailored to individual students with HFA. "Technology for students with HFA can provide another way to assist them in learning and or communicating their needs" (Participant 15). This responder felt as though such technology should be a part of differentiating instruction because, with technology and technological aids, students exceled and increased their knowledge retention. Use of technology was appropriately part of Task Analysis (TA) evidence-based practice in which students became more independent during complex target skills or behavior.

Pacing was also a concern for educators. Students were assigned a task with a deadline. Participant 17 reported that her students with HFA worked more slowly than their peers. When she allowed them to use an electronic device, such as a Chromebook, to complete the assignments during interventions, the students with HFA worked at their own pace, but managed to complete the assignment within a reasonable timeframe (Participant 17). With this differentiated form of small group intervention, the educator could meet individualized academic

needs. If the technology was unavailable at the time, the educator handwrote the students' responses for a reasonable timely completion.

Accordingly, the educator scripted (SC) their dialogs for the students with HFA. However, the non-IEP students were placed at a disadvantage when they required assistance from the educator because that educator was occupied with another student. This process sometimes decreased the education equity of the other students in the classroom.

One special education teacher reported that, even though not directly stated in her students' IEPs as TAII, she preferred to use technology when differentiating instruction because she was able to approach concepts via different avenues of learning. She altered lessons and met the specific learning needs of her students with HFA. She felt that without technology, the task of differentiating material for her students would have been more difficult (Participant 18).

External resources. External resources were available to one special education teacher who declared that she used them as intervention strategies for the accommodation of VS and MD for students. The students did not have VM included in their IEPs; however, the educator utilized technology, when it was available, as support in providing the documented accommodations. The resources found online were incorporated into her intervention lesson plans as differentiated instruction (Participant 12). Her students with HFA needed visuals to better comprehend vocabulary words. She could also show them the meaning of the word because it was accompanied by a short animation. For example, she used Pearson Easy Street, an online resource program in which a narrator spoke the vocabulary words aloud before a picture of the word appeared and a short animation showed students what the word meant. One vocabulary word was "transplant". The narrator stated the word, then showed a picture of a tree in one spot before a secondary picture showed it in another spot. Finally, in the animation, a tree was

uprooted from one spot and physically moved to a secondary spot. In this way, the students connected the vocabulary with an action (Participant 12).

Theme three: Technology increased educational equity. Educational equity is a term used to describe equal access to the full curriculum in public education for all students regardless of race, gender identity, sexuality, or disability. Often, educators that differentiate instruction can increase the educational equity in their classrooms. However, the two terms should be discussed separately. Furthermore, when the educators discussed the use of technology, they were referring to additional technology not included in their IEP. They maintained that they met the required technological accommodations as stated in the IEP but felt that additional technological aids would have been beneficial to include in the interventions provided to their students with HFA. Yet, most students with HFA did not specifically have TAII included in their IEP.

Bridging the gap. Several educators stated that they used technology to close the margin between peers with and without disabilities, especially those students with HFA. "Technology can help bridge the gap between HFA and other students in the classroom as HFA students typically feel more comfortable with devices in hand," (Participant 7). Educators aimed to produce educational equity in their instructional strategies for students with HFA by integrating technological aids and electronic devices. Because of the uniqueness of students with HFA, educators stated they were more successful when they used technology versus when they did not.

> I am in favor for students with HFA to receive technological interventions. My students this year are on iReady intervention for both reading and math. This is a research-based computer intervention that focuses on bridging the academic gaps. My students are responding very well. (Participant 10)

Administrators of public schools that received Title I grants used the money to purchase

software licenses of research-based interventions such as iReady. However, iReady itself was not an actual IEP accommodation but would be an acceptable instructional strategy as a part of VS, MD, VM, TAII, PP, or even RIR. Purchase of the program was comparable to the purchase of special textbooks when providing appropriate materials for a student's resource service needs.

Thus, for iReady, students with HFA who had an IEP were provided with a login and password to practice targeted skills. The licenses were purchased by building administrators in an effort to increase educational equity. Special educators provided the administration with a rationale for the special education students they chose to enroll in the program because not all special education students were candidates for that specific electronic aid. Therefore, this special educator chose her students with HFA due to the positive way they responded to technology.

Participant 11 stated, "students with HFA should be able to receive the same educational options as general education students whenever possible". She then continued to describe her thoughts on the topic. She discussed the opportunities for students with HFA when they were provided with technology compared to when it was not available. When students were assigned a task digitally, they completed it fully; when they used a pencil and paper, they tended to procrastinate, refused to complete it, or did not have enough time because they could not write as fast as their non-disabled peers. When provided with a choice, students with HFA felt more comfortable using the computer when it was available. Still, if the student's IEP did not specifically state TAII or VM, the student did not have to be provided with an option to complete the task digitally.

Absence of technology. Another participant explained that she felt the absence of technology led to educational inequity. "Educational inequity causes many schools to struggle with providing their students with the resources they need that will assist teachers in instructional

delivery" (Participant 19). She then elucidated that the technology was necessary to achieve educational equity and that the Title I program negatively impacted teachers' ability to provide students with HFA equal access to a quality education,

> Since not all schools received the same funding, or allocation of funds for specific types of technology, some schools have received substantially more technology and resources compared to schools such as rural community public schools. Thus, without the available or updated technology, interventions for students with HFA may stagnate when they must continue to use older electronic devices. (Participant 19).

Respondents identified that not using technology for students with HFA affected the increase in educational equity because they may have had inaccurate data. Participant 3 argued that she mandated technology usage in her classroom.

> I find it to be a platform that makes it easier to provide a variety of instruction and different ways to access learning. It is also fun and familiar for students, so they thrive with technology. If my HFA students did not use technology that they used for their interventions, it would likely decrease their motivation to complete the intervention activities. Additionally, it would limit their options for ways to demonstrate their understanding of a concept and could lead to data that does not accurately reflect their understanding. (Participant 3)

She continued to discuss how her students had demonstrated marked differences on assessments when they completed interventions using technology as compared to when they did not. She felt that not using technology negatively impacted her students' educational equity, regardless of whether it was mandated through their IEP.

Advocating for technology. Some educators explained that their students with HFA required additional research on subjects or topics to further understand concepts and skills. "I feel technological interventions and educational access is quite beneficial. If an HFA student is having difficulty understanding a certain concept, he or she can use technological interventions to help further his or her grasp" (Participant 5). Another educator stated, "By the use of technology at their fingertips during instruction, this allows my students with HFA to broaden their curiosity for research far faster than I as an instructor can give," (Participant 6). These educators contended that technology was a necessary tool for students with HFA to access the full curriculum and increased educational equity regardless of whether their IEP accommodations required educators to provide TAII. They advocated for their students with HFA, to have consistent access to technology and technological aids.

Theme four: Use of technology increased the ability to access ToM. ToM or Theory of Mind refers to the ability to conceptualize the thoughts, feelings, needs, and wants of others. Ultimately, this comprehension of another person's perspective induces feelings of sympathy, empathy, and compassion. Individuals with HFA struggle with social skills and placing the needs of others before their own (Rice et al., 2015).

ToM is not an evidence-based practice listed under the National Clearinghouse on Autism Evidence and Practice (NCAEP). Yet, educators agreed that proper and appropriate interaction with peers and adults was vital to the success of their student with HFA. Therefore, in an IEP, the accommodations were listed as Social Skills Training (SST), Peer- Mediated Instruction and Intervention (PMII), and Cognitive Behavioral Intervention (CBI).

Social skills training. Professional school counselors were responsible for the majority of SST and supported educators when they provided CBI and PMII. All educators, including the

school counselors, felt that these accommodations were a vital component of successful collaboration with other disabled peers, non-disabled peers, school staff, educators, and adults, stating that there should have been a combination of face-to-face interaction as well as technology and technological aids in the training for accommodations. In addition, educators suggested that they felt social behavior was an important part of instructional strategies. Students needed appropriate social skills when they were required to complete peer collaboration assignments.

> I think the use of technology for students that have HFA has proven to be a great success time and time again. Technology interventions gives an opportunity for students with HFA to have alternate social settings with new ways of communication for socializing and learning new concepts. (Participant 1).

The alternative social setting was a shared electronic platform, such as Google Classroom, or live shared documents. These were used as technological tools for interventions for students with HFA as a part of their SST, PMII, and CBI.

Communication. According to some educators, students who used social media or other electronic forms of communication as part of their CBI slightly increased their ability to conceptualize the feelings of others. “Through project-based learning, students develop natural abilities with technology and engage socially with other students” (Participant 7). This educator’s students with HFA communicated and collaborated with other peers successfully and completed assigned projects. She did not have to intervene by insisting upon compromise; instead she monitored students’ communications electronically and found that there were little to no problems.

Another educator agreed by attesting that her students became more uninhibited when using electronic platforms to communicate and collaborate.

> Technological access helps students with HFA to navigate in their natural setting because it allows them to control how they are perceived, rather than hide, their unique qualities. Technology allows students to seek social connections in a less intrusive way while learning content at the same time. (Participant 8)

The educator expressed her opinion that she favored the use of technology for social communication when a student with HFA had to complete a project with peers.

Other educators reported that the students agreed more, the adults intervened less, there were little to no tears, and fewer emotional breakdowns by students with HFA. These students compromised more effectively and allowed others to incorporate different ideas. Thus, the educator believed that using technology helped her students to increase their ability to conceptualize the feelings of other students.

Collaboration. Participant 11 believed that technology was beneficial to her students with HFA when the students used the electronic platforms and communicated with others. "Students with HFA and severe language impairments can be benefited by the use of technology by helping to improve their communication skills," (Participant 11). She conveyed her beliefs and explained that it was imperative for all students to effectively communicate with one another in the classroom. In the past, she had given collaborative assignments and required students to work in groups or pairs. She felt that her students with HFA required technology to collaborate more effectively. The students shared an electronic platform and were able to complete an assignment without complications. She believed that her students with HFA provided input, collaborated, and compromised with others. The evidence-based practices of CBI, PMII, and SST were not

technology-specific, so the educator used the technology to provide the accommodations when the technology was available to her.

In addition, one educator considered technology an essential part of her classroom, especially for students with HFA in order to communicate for collaboration with others. "Integration of technology is a great tool for students with HFA. HFA students tend to struggle socially so giving them the chance to use technology can benefit them. They will be able to collaborate with their classmates more effectively" (Participant 14). She described how her students with HFA became more confident in their abilities and used technology as a tool for communication. She then explained that her students sometimes used the technology as a platform for socializing with others. Rather than simply chatting online, emailing, or texting, they taught other students how to use certain programs or create projects. Her students were better able to understand and care about how their peers felt, increasing their ToM. The educator met the accommodation requirements of the evidence-based practices of self-management, CBI, PMII, and SST by using the technology when it was available.

The capability to efficiently communicate with others was an important topic that one educator discussed in length. She verified that technology was a necessary part of her students' intervention strategy for Functional Communication Training (FCT), to help them communicate more effectively. "Students with HFA should use technology as an intervention strategy. It allows them a means to successfully communicate" (Participant 17). She explained how students were expected to work together in heterogeneous groupings during a specific part of daily lessons. Her students with HFA needed to improve their socially acceptable behaviors to successfully complete the collaboration part of instruction. When they utilized technology to

complete group assignments, they communicated and compromised more successfully with their peers.

Theme five: The IEP team chose not to include specific technology in a student's IEP. When the IEP team met to discuss the accommodations, goals, and interventions to be included in a student's IEP, the special education chair was mandated to include evidence-based practices and not label a specific type of technology aid, device, or program. The two-technology specific evidence-based practices listed by the NCAEP are TAII and VM (National Professional Development Center on Autism Spectrum Disorders, 2019). If either or both accommodations were included in a student's IEP, the school would be required to provide the technology (U.S. Department of Education, 2019).

Exclusion. IEP teams purposely refrained from including specific technology in a student's IEP for various reasons. Educators stated that the IEP team was not permitted by federal law to include any specific device or program in a student's IEP (U.S. Department of Education, 2019). Instead, they chose from a list of evidence-based practices that would become a student's accommodations (Maryland IEP Online, 2019). For students with HFA listed with a disability code of autism, there were approximately 27 identified practices to choose from. Out of the 27, only two practices are solely technology-related: Technology-aided Instruction and Intervention (TAII) and Video Modeling (VM; National Professional Development Center on Autism Spectrum Disorders, 2019).

Educators chose to include mostly nontechnology-based practices in a student's IEP. An educator was still able to use technology within an accommodation, such as VS or MD, and even SC; however, when technology was inaccessible, educators still had to provide services and accommodations stated within the IEP.

In order to remain in compliance with a student's IEP, the team was hesitant to list TAII or VM because technology was not always equally available at every school. For example, if a student moved to a different school, the school may not have the technology. Instead, by including other nontechnology-based accommodations in the IEP, the educators were able to use the available resources, including or not including technology, to help students attain their IEP goal. Since some educators were unsure whether the technology would be provided at another school if the student moved and instead stated, "Each student with HFA has different needs, they may not respond to a particular program well. If it's stated in the IEP, then that program must be used even if it is not helping the student" (Participant 12).

Other educators had witnessed direct violations where the student with HFA had the TAII listed in his IEP and was not provided services by the special educator. Therefore, in order to be compliant with the student's IEP, he used his laptop to provide the student the required accommodations. This put him at a disadvantage when teaching the class without his computer.

Some educators pointed out that technology was deliberately omitted from the IEP to encourage more personal interactions. "I think that it (technology) is not included because the IEP team wants to ensure that face to face interventions are also implemented. If they chose to include technology integration, then that might be the only intervention a student may receive" (Participant 1). Another educator stated, "Technology is great, but it doesn't take the place of social interaction. Social interaction plays a very big part of the learning process of students. It's how we learn as humans and synthesize information" (Participant 5). The included evidence-based practices would have been SST, self-management, and CBI, usually led by the professional school counselor in a face-to-face setting.

Flexibility. Instead, goals and objectives were included in the IEP for a student so that the special and general educators could be flexible in meeting the goals. The educators were able to assess the student with HFA, find the best fit for intervention strategies, and include, limit, or omit the necessary technology during certain sessions. By not including a specific program or device within the IEP, the educators had more freedom to find interventions they deemed appropriate.

Some evidence-based practice interventions they chose, such as VS and VM, included technology, particularly iReady, and some interventions did not. As the needs of the students with HFA changed over time, either progressing or occasionally digressing, the educator was free to choose the intervention strategy. Moreover, when the IEP team did not include TAII or VM, the educator, school, and county would not be out of compliance if technologies and technological aids, such as Chromebooks, iPads, or desktop computers, were not available. The unavailability of the devices was especially prevalent during state-mandated testing for the PARCC test. A student with HFA was to receive services during every week of their school year, regardless of state-mandated testing times (U.S. Department of Education, 2019). One special educator was candid in her response to the available technology, "Technically, when it is a documented need of the student, the school needs to provide it. But hey, sometimes computers are not available especially during PARCC testing" (Participant 10).

Theme six: HFA students without an IEP did not consistently receive technology. Seminal literature and research indicate that technology use is a successful treatment for students with HFA (McCleery, 2015). In non- clinical terms, technology should be used within intervention strategies for students with HFA to maximize academic success. Use of technology will equalize access to the full curriculum.

The educators that participated in this study expressed their professional opinions regarding the use of technology when they worked closely with their students with HFA. They believed that technology was a beneficial aid for the classroom. However, there were some impeding factors that prevented the daily use of technology for their students with HFA who did not have an IEP.

Budget constraints. Educators agreed that technology usage in the classroom was beneficial for students with HFA. Yet, according to the participants, the technology was often outdated or unavailable. Educators insisted that the absence of appropriated funds for technology meant they were not provided with the updated electronic tools they believed they needed to successfully provide interventions to their students with HFA. "Time, money, and resources are all reasons that technological interventions when implemented for students with HFA are not done so with fidelity" (Participant 7). This participant felt strongly that if she had regular access to updated electronic devices, she would have been more effective, efficient, and successful when delivering intervention strategies to students with HFA without IEPs. She stated that when she used the available technological aids, her students demonstrated educational gains of knowledge retention and learned skills.

Special and general educators believed that budget restraints delayed technology refreshment and upgrades. Participant 2 discussed the need for updated technology to be more efficient during her implementation of intervention strategies for students with HFA. Older devices were used to access the application software programs via the internet; however, there was some software lag.

My students with HFA use the software program Study Island during interventions on specific days. Sometimes they must access the program using an older computer in which

> the graphics may glitch or stall. So, as the avatar is teaching them a lesson, the sound does not match the scene, and the avatar may disappear before it is finished speaking. (Participant 2)

Furthermore, some older electronic devices were not compatible with the new browser requirements to watch certain video clips or play math games. Educators felt that accessing those applications would have been helpful in implementing small group intervention instruction.

> My one student that has HFA needs assistance in dividing large numbers. He absolutely hates rote arithmetic drills. If I want to reach him, and decrease emotional outbursts, I set up the Math Antics video clip on the computer to remind him of the steps to divide large numbers. Then, I set a timer for 10 minutes for him to complete the practice problems. If he successfully completes the problem without behavioral issues, I then set a timer for three minutes for him to play a math game. This works well, unless I have an older computer that day and some of the math games cannot be played because the graphics card is not up to date. (Participant 7)

General educators worked with the devices they had and utilized the technology as much as possible within their intervention groups. They stated that they would appreciate regular technology updates.

access. The consensus was that educators used the available devices to provide intervention strategies within small group instruction for their students with HFA without IEPs. Nonetheless, they noted that if they had access to more technology choices, they could have been more effective. In both schools, there were a limited number of smartboards. The educators stated that students with HFA benefited from the hands-on movement of the drag-and-drop items on the screen and the use of a tactile stylus pen helped improve writing skills,

> I was able to reserve a smart board to use specifically with my two students that have HFA. They became super excited when they moved objects on the screen with their fingers! They asked if they could use it every day. (Participant 3)

A lead instructional teacher reported that she "would definitely use technology more, if possible" (Participant 17). She further explained that technology was limited due to lack of updated devices. She wrote grant applications to lobby for more technology in her building because she felt there were insufficient electronic devices. The allotted funding from the state was inadequate for a major technology update, so she assumed the responsibility and applied for assistance. She believed that students would be provided with more opportunities to use technology in the classroom if newer electronic devices were present.

Educators agreed that regardless of whether their students with HFA had an IEP, they would benefit from the daily use of technology and technological devices. When they provided differentiation for their students, they aimed to integrate technology as much as possible. Adversely, when technology was unavailable for their use, the educators had to become creative when implementing differentiation to meet the needs of their diverse learners with HFA.

Reduced training. The educators felt it was critical to be trained to use the available technology because students with HFA may not require an IEP but still needed interventions. Therefore, it was not mandatory, nor out of compliance, if students were provided with non-technological interventions. Yet, if the technology was available, the educators felt more inclined to use electronic devices with their students with HFA, given their preference towards use of technology.

Participant 4, an experienced general educator, shared concerns regarding the absence of technological professional developments that she felt would aid her in the classroom. She stated

that a major prohibitive factor for using technology in intervention strategies for students with HFA was that she had not been shown how to use the device, program, or electronic platform. She felt this was extremely detrimental to the progression of her students with HFA. She also confirmed that professional development training, featuring specific technological aids or programs, were not included in county-wide professional development opportunities (Participant 4).

Another educator professed that she viewed technology "as a means to an end" (Participant 1). She suggested that an electronic device such as an iPad, laptop, or tablet did not, in and of itself, constitute an intervention. Lack of proper training was the primary reason that integration of technology within interventions for students with HFA was not always implemented successfully. "A teacher's comfortability [sic] with using the technology is problematic, which training and PD could address" (Participant 7).

Some educators were dependent upon technology and viewed the absence of training as a negative aspect to instructional delivery. "The only thing that would prevent me from using technology as an intervention is not having technology or the training to use it" (Participant 9). He stated that he felt that his students with HFA would stagnate if he did not incorporate innovative software programs. Time was also an issue; he did not have the time to try to figure out how to use a certain program for his students. He pointed out that professional developments centered on incorporating specific software programs would have eliminated his issues.

One general educator was adamant regarding her need for training and professional development centered on the use of technology in her classroom, especially for her students with HFA. "It's mainly my lack of knowledge about the availability of technology and programs, the lack of equipment and programs, and the lack of technological knowledge" (Participant 13). She

continued by stating, “I would include much more technology for interventions for my students with HFA, if I had the time to learn about it” (Participant 13). She explained that her training needs involved extensive in-depth training, ideally in a small instructional group setting, where she could practice using the software instead of simply being shown its features.

Difficult to include in planning. Many educators relied on technology for planning, preparation, instructional delivery, supplemental aids, and intervention strategies. Unfortunately, technology was often unavailable or outdated. Educators claimed they became extra creative when omitting technology, which took more time to plan without technology integration in the interventions.

minimally available electronic devices. Due to their propensity towards favoring electronic devices, participants specifically indicated their frustration due to unavailability of said devices, which in turn affected their ability to plan interventions, specifically for students with HFA. “Over the years, I have learned to be creative and use what I have to meet the instructional needs for students when resources are limited. I do believe plans would be more effective with the incorporation of technology integration for HFA students” (Participant 7). “Lack of resources impacts my ability to plan interventions for my students with HFA” (Participant 8). “This limits the interventions I can provide” (Participant 15). The educators had similar complaints concerning the absence of technology for their students with HFA and how it impacted the students’ instructional intervention needs. They discussed how they felt obligated to develop alternative plans that omitted technology within their interventions if technology was unavailable to use on a specific day.

General educators felt they were forced to plan without the incorporation of technology within the intervention services for students with HFA. “Teachers have to plan around

technology use because they don't have access to technology. Therefore, teachers must make use of the resources they have access to such as math manipulatives" (Participant 19).

One educator stated, "when I do not have the proper technology, it makes planning difficult" (Participant 17). This participant, as the instructional lead teacher, pulled specific groups to work on target skills. She believed that the absence of available technology for her use during intervention strategies for reading or math, was a disadvantage for both herself and her students. While the students she served did not have an IEP, her job was to provide specific students with instructional interventions. When technology was unavailable to her, she used traditional methods of books, paper, and pencil. "My students that have HFA are not as invested in learning when they cannot use some type of technology during my intervention sessions. It's frustrating when I do not have electronic devices to use" (Participant 17).

double planning. Another educator searched for instructional strategies that could be implemented with or without technology. She had to research for additional materials because electronic devices may not have been available during her interventions for her students with HFA. "There are several interventions available that do not consist of using technology for the lesson, therefore, when technology is unavailable, I use those plans instead" (Participant 18).

Participating educators agreed that when they planned with technology integrated into their lessons and interventions, they were also required to create a secondary alternative lesson or intervention that did not include technological devices. However, they asserted that the absence of the technology was detrimental to their teaching.

> It would impact my planning for interventions for my students with HFA because I have come to rely heavily on using technology, which has so many options for interventions,

and without it, I would feel like my teaching was regressing rather than progressing. (Participant 3)

Since specific students with HFA required interventions, educators stated they had to plan when the electronic devices would be available ensuring that the time slot would coincide with the intervention time block. “I think that you need to be strategic with the time of day and length of intervention, so it works in favor of the HFA student and so that the student is not overwhelmed” (Participant 1). She further explained that as a reading specialist, she had to adhere to the master schedule created by the principal. The prominent issue, in her building other educators shared the technological devices. The electronic devices were not always available for her use when working with her students with HFA without IEPs. Participant 4 agreed by stating that she always created plans to use technology within an intervention for her student with HFA. Unfortunately, due to the limited number of electronic devices available in the school, she sometimes had to forgo interventions with technology and use alternate plans.

Negative drawbacks. Since educators felt that purchasing the electronic devices or licenses was not always the priority for school administrators, participating educators expressed frustration with the lack of technology purchases for their students. The limited number of technological devices negatively impacted their ability to implement interventions consistently to students with HFA without an IEP. Many educators generated a second set of alternative plans in case technology was unavailable to them for their planned lesson. Educators complained about the extra time it took to create the secondary plans. They felt as though they had enough responsibilities without additional duties.

Chapter 4 Summary

Impact. My study investigating how educators experience technology in the context of interventions for students with HFA may prove highly useful to the educational community. Teachers, administrators, instructional lead teachers, literacy coaches, math coaches, science coordinators, early childhood educators, resource teachers, paraprofessionals, dedicated aides, and specialists could better serve the needs of their students by analyzing the results of this study, because they will comprehend how educators use technology in real time. They will be able to use the results when they plan intervention services for students with HFA who have or do not have an IEP. Since all educators have the same goal – to deliver the full curriculum to all children regardless of capabilities – I conducted the study to address how educators experience technology to achieve their goal and the reasons an IEP team refrains from including technology in a student's IEP. I also discovered how students with HFA without IEPs are impacted by unavailable technology integration within their differentiation instructional practices.

Integrated technology. Participating educators felt as though technology was an invaluable tool through which they could maximize student success by utilizing it in interventions and accommodations for students with HFA. They asserted that technology should be used daily in instructional interventions and that proper use by educators would promote educational equity and increase social skills related to ToM. Educators felt they could differentiate instructional needs more efficiently by using electronic platforms, but that training was not always available to those who needed it most.

Implications. In Chapter 5, I have addressed the implications of this study for use in the educational community. The results have been interpreted as a meaningful discussion that will enlighten others about the concerns regarding technology and how educators experience the

central phenomenon. I have also detailed the significance of the recurrent themes and how they relate to the experiences of participating educators when they incorporate technology into intervention strategies for students with HFA.

Chapter 5: Discussion and Conclusion

The purpose of this study was to investigate how educators in the public school system experienced the use of technology during intervention strategies for students with HFA. Since, there has been an increase in autism diagnoses each year (CDC, 2018), I believed this study was important. By interviewing active educators, the information provided was related to the issue of technology use within the public school system during intervention instruction for students with HFA, an informal term used by professionals to categorize people with ASDs an IQ of 80 or greater (Autism Speaks, 2019).

Introduction

The results of this study can be used by all stakeholders in the educational community. By understanding the needs of our diverse learners, specifically students with HFA, stakeholders can advocate the dispersal of more appropriate funding to accommodate those students. Administrators should take interest in this study because it will help educators become more efficient and deliver effective interventions to students with HFA, since both general and special educators are responsible for the service learning hours of their students with IEPs (Maryland IEP Online, 2019). It is also the responsibility of the general educator to conduct intervention groups for students with HFA who did not qualify for an IEP.

In Chapter 1, I introduced the subject of the study and provided a brief background of the need for technology use within the public school system. In Chapter 2, the subject matter was connected to literature reviews of previous research that pertained to technology use within intervention strategies for individuals with HFA within a clinical setting. In Chapter 3, I included the methodology of the phenomenological process and the processes I intended to employ during my study. In Chapter 4, the reader was provided with the results from the study's interviews,

which included emergent themes. Thus, Chapter 5 is a vital component of the research process. In this chapter, there is an interpretation of the results in conjunction with the impact on the public education forum as well as the implications for future researchers.

Summary of the Results

The intent of this study was to understand how educators experienced technology use during intervention strategies for students with HFA. The research questions were as follows:

- How do general and special educators describe their experiences using technology during interventions for students with HFA?
- What factors are IEP team committee members considering when they decide to include or refrain from adding technology accommodations within an IEP for students with HFA?

Conceptual framework. The conceptual framework was designed to incorporate several theories to be addressed within this unique study. Educators discussed persuasive technology, specifically their opinion involving the implementation of technology during intervention strategies for students with HFA. Secondly, Theory of Mind (ToM) was also discussed and the educators attested that they felt their students became more conducive to collaboration with fellow peers. Educational equity was the third component of the conceptual framework. Educators were adamant that technology was assistive in bridging the gap that increased educational equity for their students with HFA.

Persuasive technology. In reference to seminal literature and peer-reviewed studies, persuasive technology was examined quantitatively and qualitatively in clinical settings, which proved valuable for individuals with HFA. While conducting their study, Odom et al. (2015) focused on the factors within an individual, characteristics of the messages or information

conveyed and features of specific contexts, in which the researchers concluded how behavior improved with the use of persuasive technology. Thus, Odom et al. (2015) concluded that behavior could be altered in individuals with HFA when they utilized technology. Pinchevski and Peters (2015) claimed that, "the Internet was the conditio sine qua non for the ASD community, a medium that opened up new opportunities for exchange while freeing them from the ambiguity and sensory overload of the face-to-face" (p. 2517), a statement in which the researchers supported the usage of persuasive technology, mirroring the results that Odom et al. (2015) referred to in their study.

Theory of mind. ToM is a challenge for individuals with HFA. Richmond and Bidshari (2018) describe ToM as:

> The affective cue classification system performs emotional pattern matching, drawing emotional contagion from various cues such as emotional expression and body language that signal the affective mental state of another. The mirror neuron system can also bring about emotional contagion through autonomic or mental imitation of observed actions. (p. 46)

Individuals with HFA struggled with the ability to understand the emotional state of another person and could not adequately match the emotions and feelings. Therefore, it was sometimes difficult for them to demonstrate empathy. Technology has been used in clinical studies as an aid to researchers when they attempted to increase ToM in individuals with autism and HFA.

Educational equity. Lastly, educational equity is used to equalize full curriculum access to students enrolled in the public school system. Accomplishing educational equity can be challenging for educators when the needs of their students are not met due to an absence of technological aids, especially when students are delegated to be placed in the least restrictive

environment (LRE). “Academic achievement becomes increasingly important as the number of children on the autism spectrum served in the general education setting increases” (Whitby & Mancil, 2009, p. 552).

IEP inclusion. The general and special educators relayed the importance of inclusion of technology within instructional intervention strategies for students with HFA. Analysis of their interview transcripts indicated that they felt teaching materials and standards would be less effective without the daily use of technology. Educators personally reflected that they would be committing a disservice to their students by completely omitting technology. In order to move forward with new strategies and instructional practices, educators must keep abreast with the newest types of technologies, including software programs, apps, and electronic devices (Lee, 2019). Students with HFA tended to respond more positively to the inclusion of technology. The students stayed engaged longer and were more invested in their learning process.

IEP exclusion. In some cases, the IEP team chose to exclude technology-based interventions in the IEP. When an accommodation or tool is listed in the IEP, the student must use it. Therefore, if a specific technology-based accommodation was listed in the IEP, the educators would be required to use technology with the student even if the technology was unavailable for a variety of reasons. If the accommodation was not provided, the general and special educators had not followed the student’s IEP. In order to avoid possible litigation, the IEP team chose specific goals that included nontechnology-based accommodations, so educators could adjust the strategies within the intervention session and still remain in compliance with the IEP. When electronic devices were accessible, the educators would incorporate technology into their evidence-based practices. Moreover, the educators stated that social interaction was equally

as important to increase collaboration skills and they would use technology in conjunction with face-to-face interventions.

Exclusion of technology for HFA students without IEPs. This theme became evident after speaking with the participants regarding technology use with their students with HFA. Since not all students with HFA required an IEP, general educators still assumed responsibility for providing interventions to students who needed support in certain academic areas. Educators preferred integration of technology within the interventions but did not always have access to technology, such as electronic devices or technological assistive aids. Since students with HFA did not possess IEPs, the educators and schools were not out of compliance when they did not provide technology integrated within intervention strategies.

Benefits. For the study, I have collected information that is valuable for public school education reform. The administrators of each building are responsible for allocating funds in their school budget. By better understanding the needs of the students and teachers, administrators may be able to make more informed choices regarding technology purchases that benefit students with HFA.

Seminal literature. There is a continuation of past and present literature review regarding the use of technology in education for students with autism, especially HFA. Past researchers, such as Ploog et al. (2013) have staunchly stood by their research implicating the direct benefits of using CAT for students with HFA. In their study, they used video clips, sound bites, internet programs, software applications, and interactive websites. They stated that their research showed a significant increase in participation, engagement, and knowledge retention.

Recently, technology was evaluated by researchers for the benefits of use by educators within the classroom. Laurie, Manches, and Fletcher-Watson (2018) conducted a quantitative

study regarding the type of electronic device used by educators for students with autism, including HFA. The researchers addressed which electronic devices were most popular among educators. Laurie et al. (2018) indicated that the invested community should have a voice in choosing the implementation method and type of device used within the classroom for students with HFA.

Discussion of the Results

I believe that the educators provided valuable information about the use of technology within intervention strategies for students with HFA. Based on their personal experiences, professional opinions, knowledge, and years devoted to educational service, the educators' narratives produced insight into the world of technology use within the public school classroom. As there were pros and cons when technology was integrated within instruction, the educators delineated specific occurrences that represented their views on technology implementation.

Student engagement. Evidence-based practices listed in a student's IEP usually consisted of VS and MD. While these practices as accommodations were not technology-based, educators used electronic devices and digital supports whenever the technology was available for use. The educators stated that student interest and engagement increased when technology was used within intervention strategies. An important factor to note was that individuals with HFA tended to gravitate towards the use of electronic devices. Referring to literature reviews, Odom et al. (2015) stated, "the unique appeal of electronic technology for children and youth with HFA, has engendered much excitement about its use in educational, clinical, and community settings" (p. 3806). The graphics, movement, colors, and music tended to hold the students' attention and led to more participation from students with HFA (Sabella & Hart, 2014). Therefore, the

incorporation of technology within interventions for these students was vital in maintaining student interest (Donaldson & Zager, 2010).

Since all the participants substantiated that student engagement increased when utilizing technology in the classroom, the best practice would have included incorporation of daily technology into intervention strategies, whether it was 15 minutes of iReady software that began instruction as the VS accommodation or short video clips that introduced the lesson as the accommodation for MD. The visual aids, sound, music, and graphics caught the students' attention and established a tone for positive learning behaviors. Students with HFA preferred the established routine, became excited and wanted to continue learning.

Reduced anxiety. Individuals with HFA gravitated towards an internet-compatible world. Pinchevski and Peters (2015) surmised that, with the predictable environment, individuals with HFA felt more comfortable in this type of setting. Therefore, any use of technology with or without the internet placed their mind at ease when electronic formats were integrated within their learning environment.

Given that individuals with HFA preferred a digital world, daily use of technology may have reduced anxiety. de Giambiattista et al. (2019) conducted a study concerning the anxiety and depression experienced by individuals, specifically those with HFA. The researchers found that there was a prevalence of anxiety among these individuals, sometimes accompanied by depression. Provision of a predictable, safe environment would decrease anxiety and, possibly, depression (de Giambiattista et al., 2019). de Giambiattista et al.'s (2019) research was applicable to my study because the participants stated that the use of technology would have been acceptable under the evidence-based practice of ABI for decreasing interfering behavior that led to heightened anxiety. When technology was available, the student would be able to use

it to complete assignments, collaborate with peers, or play a short educational game to cope with everyday stress and anxiety. When devices were unavailable, the accommodation was still provided to the student but instead involved a short walk, removal from the classroom, reading a book, or a phone call home. Educators preferred technology because they found it was more efficient in calming the student without unnecessary removal from the classroom.

Schohl et al. (2013) also conducted a study involving using a certain type of electronic platform that helped reduce anxiety in individuals with HFA.

> Those with AS/HFA are typically self-conscious of their differences in social functioning, and indicate that they experience stronger feelings of loneliness and poorer quality friendships than their typically developing peers. As a result, a significant number of adolescents with AS/HFA are at an increased risk for a variety of secondary psychopathy, such as depression and anxiety. (p. 532)

The researchers discovered that individuals with HFA purposely avoided social interactions with others due to a frontal cortex physiological change that led to overstimulation. Therefore, the researchers concentrated on evaluating the effectiveness of a digital platform that helped ease the anxiety of individuals with HFA by replicating the more predictable environment they desired in an electronic format (Schohl et al., 2013).

Incorporation of technology. Consequently, integration of technology into daily instructional intervention strategies provided students with HFA an opportunity that reduced anxiety and they became more engaged within lessons. They worked at their own pace without fear of repercussions from neighboring peers, consequently, felt more secure in their academic endeavor. Severe behavior issues also decreased.

Without the specific accommodation of TAII, educators discovered another way to incorporate the technology into their student's educational intervention plan and still follow their IEP. However, educators disliked when technology was unavailable for their students' use. They felt it hindered student progress when interventions were provided without integration of technology or technology-aided assistance.

Differentiation. Differentiation is a critical component in addressing the diverse and varied needs of learners (Kozleski, 2017). In order to accomplish effective differentiation, educators must level the instruction according to the academic needs of their students with HFA (Lytle & Todd, 2009). This can be especially challenging for students with HFA (Lytle & Todd, 2009); therefore, special and general educators were able to tailor instructional needs for their students when using certain technology (Barton et al., 2017).

Visual supports and modeling. When using technology, educators believed they were afforded the opportunity to differentiate according to their students' specific needs. Rarely has TAII or VM been specified within an autism-coded student's IEP. However, other autism-specific evidence- based practices, such as VS and MD have been included in the IEP (National Professional Development Center on Autism Spectrum Disorders, 2019) and the educator has the flexibility to use technology, when available, to provide the accommodations.

Educators satisfied the VS accommodation by using adaptive software programs, such as iReady, as assistive technology. The students were shown lessons with charts and visuals on the program, which helped them work at their academic grade level. These software programs, which included visual aids and modeled concepts, were designed to provide lessons for reading and math that were customized for the user's learning needs. As the student met a certain standard, the adaptive program adjusted the curriculum to fit their academic needs. Adaptive

software technology use was important to consider for effective differentiation of student instruction. If students were able to receive tailored instruction according to their educational needs, then the administrators ought to have opted to purchase the licenses for the software.

Use of technology for inclusion. Thus, students with HFA were at risk for being excluded from activities due to inadequate differentiation (Martin, 2013). However, with the integration of technology within intervention strategies for students with HFA, effective differentiation was possible. When a student had the accommodation of SC in their IEP, the educator was required to transcribe a student's answers verbatim. This was considered a time-consuming process and educators opted to use speech-to-text programming when they had the available technology. When the students used the speech-to-text program, they felt more at ease to work at their own pace instead of having an educator wait to record answers. Thus, educators took advantage of free online programs to provide individual instruction to their students with HFA.

When Task Analysis (TA) was included in students' IEPs, the goal was to become more independent within their abilities of completing complex tasks or targeted skills. When educators paired VS with TA, they decided to combine traditional and technology-aided instruction for maximized student success. Some educators utilized programs such as iReady, FASTT math, and Study Island for student use. Each program contained different grade levels; the educator chose the appropriate grade level for the student and allowed them to practice skills on their academic level, a strategy that was part of a differentiated instructional program. The programs were also used as a reward for applying their self-management accommodation listed in their IEP.

Yet, intervention strategies had to be taught by the educator because the technology itself was not considered an intervention, but a tool utilized to achieve a specific goal. In this case, the

outcome would have been differentiated instructional interventions customized for students with HFA. When the technology or technological aids were used by the educator to reinforce taught lessons, the general and special educators attested that they witnessed increased student engagement, knowledge retention, and overall enjoyment for learning.

Educational equity. Regardless of whether students with HFA had specific technology evidence-based practices, such as TAII or VM, for accommodations within their IEPs, educators determined that technology should still be used daily in the classroom within other accommodations like VS, MD, SC, Reinforcement (R+), RIR, and PP. Overall, educators found that educators and students with HFA had positive experiences using technology. They believed that daily use of technology increased educational equity.

Accessing the full curriculum. Incorporation of technology into students' interventions was beneficial because it increased educational equity since the students were able to access the full curriculum in digital formats. The educators discussed the concept of educational equity at length by making statements such as, "levels the playing field" (Participant 14) and "bridging the academic the gap" (Participant 10). After all, the educators found a plethora of programs, free and for a fee, that they deemed fundamental in increasing the ability of their students with HFA to access the full curriculum of their grade level. The educators also noted that sometimes electronic devices were unavailable for use due to testing or other issues, but they were required to provide interventions and accommodations regardless of the availability of technology.

Students with HFA are at a distinct disadvantage to their peers without disabilities. Sullivan (2013) noted that Individuals with Disabilities Act incorporated legislation in which state officials were permitted to modify the definition of ASDs. Sullivan (2013) believed that the act had implications of disparity for identification practices in schools. Consequently, educators

had to be even more diligent when they attempted to equalize education for their students with HFA.

Educational equity is a term used to ensure that every student has access to the full curriculum. Students with HFA require certain intervention strategies for educators to equalize education. Technology and electronic devices should be used by educators to provide accommodations within interventions to target specific skills. Technology is in alternative formats that students with HFA can better understand or may even prefer.

Diverse learners. Watson (2018) discussed her review of literature regarding educational equity, advising that equitable educational opportunities can be obtained by implementing effective strategies and reform within the public school system. She stated that educators should begin reform by implementing strategies integrating technology and software programs that meet the needs of diverse learners, especially students with HFA. Educators were only able to provide more equalized access to academic curriculum when they used available online programs and applications (Watson, 2018). These accommodations would need to be technology-specific, such as TAII and VM, to guarantee student access to technology everyday (National Professional Development Center for Autism Spectrum Disorders, 2019).

Educational disparities were evident within public schools and would have to be changed at the macro-level for special education policies that could be enforced in the local educational environments (Thorius & Maxcy, 2015). Since inequity exists, educators should have used all tools available to them when they provided intervention strategies for students with HFA. Classroom and special educators were to have electronic devices with specialized programs to adequately serve the special needs of diverse learners with HFA.

Theory of mind. It is important to understand that ToM is a neurological process critical to the social adaptive behavior of all people. Individuals with HFA are not exempt from requiring this ability to function successfully in school. In using the full curriculum, educators are mandated that all students hold accountable talks, where students must agree or disagree with their peers and generate a meaningful discussion. Students are to become facilitators and redirect each other as necessary. Think, pair, share is part of the classroom culture and norms, thus necessitating collaboration of all students.

Social skills training. Nontechnology-based autism specific practices such as SST, PMII, CBI, and FCT were used to increase social skills in individuals with HFA. However, when devices were accessible, technology and technological aids were integrated to provide SST, PMII, CBI, and FCT accommodations to students with HFA. Subsequently, educators discovered that the daily use of a shared electronic platform increased the ToM ability within their students with HFA. Therefore, they utilized the platforms whenever technology was available for collaboration projects with their students, so students with HFA could practice their social and functional communication skills using a digital format.

Considering that students with HFA have a "false belief" deficit, educators would have to find creative ways to encourage appropriate interactions with their peers without disabilities. "False belief" is when a person understands that some situations are real and others are not, how they feel about them, and how other people feel about the same situation (Altschuler et al., 2018). The educators attested that they used shared documents and electronic platforms whenever devices were available.

Collaboration using technology. Accordingly, the electronic platforms were used for collaboration among students through shared documents. Google Classroom was also an asset

for educators that provided their students with an opportunity to work together physically or remotely. When students with HFA were presented with an assignment requiring completion with a partner, they were not inclined to favor this method. “Social impairments, inherent in high-functioning autism (HFA), interfere with the process of building relationships, functioning occupationally, and participating and integrating into the community” (Kandalaft et al., 2012, p. 34). When educators consistently used technology, including shared electronic platforms, they found that students with HFA increased their ToM ability during collaborations. The projects were a shared interest by both parties and the finished product reflected an equal effort from all students involved. The more this platform was used, the more the students learned to collaborate.

IEP exclusion. By federal law, in an IEP, all ASDs, including PPD, Asperger’s Syndrome, and HFA must be issued a disability code as autism. The Maryland Online IEP (2019) website lists regulations regarding specific accommodations for inclusion in a student’s IEP. One requirement was that the accommodations must be evidence-based practices and the special education chair cannot input a specific technology or software program. Federal law sanctions that accommodations listed in an IEP must be provided to the student regardless of cost, time, state testing week, or any other factors. Therefore, if a technology-based accommodation, such as TAII or VM, is recommended and placed in a student’s IEP, technology must be provided to that student.

Unfortunately, educators reported that they were hesitant to include technology-based accommodations within an IEP. Some felt technology would impede their process of instructional delivery; yet more importantly, they did not recommend inclusion of technology to be included in an IEP because technology was not always available. Furthermore, if a student relocated, the technology may not be present at their new school.

Although the educators chose to include different accommodations in the IEP that were not technology based, the educators were still allowed to implement the accommodation with or without technological devices or aids. Moreover, the educators were free to evaluate the effectiveness of certain software programs or electronic devices combined with non-technological strategies to find the best fit for their student with HFA.

Integration of technology as deemed appropriate. Since students with HFA tended to gravitate towards electronic technology in comparison to traditional methods, educators also felt that behavior issues may have resulted when applying other instructional strategies that were not technology based. General and special educators decided that integrating both methods would be the most successful way to deliver instructional strategies during intervention sessions. They decided that incorporation of technology or technological aids into the accommodations of self-management, SST, and CBI were appropriate and effective when they provided services to their students with HFA.

Educators stated that delivering instructional strategies to students with HFA was sometimes difficult. For example, some students did not like to write, especially during the creative language arts sessions. They disliked using pencil and paper, so they used a live word document on Google Chrome instead. The IEP team agreed that was an appropriate accommodation and could be administered under another practice such as VS or RIR. Whenever technology was unavailable, the team pointed out that students with HFA also needed to learn to write by traditional means. Therefore, some educators found that using the electronic devices as a reward for completing a task was helpful. One educator remarked:

> I write out the schedule for the session for my students with HFA because they like to know what to expect. For example, I might have them write for 10–15 minutes, then they

can play an educational game online for five minutes. This process minimizes student meltdowns for me. (Participant 19)

The IEP team agreed to include VS and MD and educators could use technology when it was available to provide the accommodations. However, if technology was inaccessible, the educators would still provide concrete handwritten models and visual supports to remain compliant with the student's IEP.

HFA students without IEPs. Since not all students with HFA qualified for an IEP, there were no mandated intervention strategies or accommodations. General educators were responsible for the evaluation of their students that needed additional support in certain academic areas. The evaluation included all students, including those with HFA, who did not possess an IEP. General educators found that they were unable to consistently provide technology during interventions because of the unavailability of certain electronic devices or software programs. They were not out of compliance because the students did not possess IEPs. Yet, the educators felt that if more technological resources were available, they would be more effective when delivering instructional strategies. Students with HFA possess a propensity and preference towards use of technology (Finkenauer et al., 2012).

Funding. Funding is a nationwide issue among public educators. In 2018, teachers went on strike and demanded funding increases for public schools. In fact, 1,800 former teachers and administrators actively campaigned for state legislative seats, which resulted in a quarter being elected into their positions in November 2018 (Brown, 2019). These educators knew first-hand the problems in the public school system because they were immersed within the organization. They were perfect candidates to advocate for change and would be more knowledgeable and

reasonable in dispersal of funds for desperately needed programs, including technology. With the newly elected officials, educators across the country hoped for a change in lawmaking.

Traditionally, lawmakers set education budgets without fully comprehending the cost to educate each student and what that entails (Litvinov, 2018). In 2018, Maryland alone had over 2.9 billion dollars in unmet needs for enrolled public students (Litvinov, 2018). In 2018, Donna Ostenso, the president of Maryland's Calvert Education Association, educated adults concerning the budget issue. With advocates like Donna Ostenso, perhaps lawmakers will increase funding allocations (Litvinov, 2018).

It is vital that funding is apportioned to include the purchase of new and updated technology, including software, electronic devices, and IP servers. Educators and students who are technologically educated are key to successful integration in a global market. "American students continue to rank near the bottom of international test comparisons" (Burn, 2001, p. 367). Being technologically uninformed will inevitably adversely affect students with HFA, leading to even greater disparities in education and the job market, and place them at a distinct disadvantage.

Professional development. A portion of the funding should be used for technology professional development for educators. Educators stated that they utilized technology and technological aids as much as possible within the intervention strategies for their students with HFA, regardless of whether the accommodation was technology-based. Even though administrators allocated funds for updated technology and software, the tools were useless when the educators were not properly trained to use them. The participants attested that they often explored and figured out how to use an electronic device or software program by trial and error. This practice was neither time-efficient nor effective.

Some educators were given eight-hour professional developments on technology but already understood 90% of the content. If the educators could choose the 10% they did not understand, they could spend more time exploring the program they were unfamiliar with instead of wasting time on knowledge they already possessed. The educators felt as though they wasted their time.

Furthermore, macro-professional development days were expensive. The public school system had to pay for substitute teachers to cover training so educators could participate, a multitude of conference rooms, and even external trainers from costly vendors to provide professional development. Educators stated that the funds could have been used for more effective technology training, specifically integration of technology and technological aids within interventions for their students with HFA.

Hence, if the county adopted different professional development procedures, overhead costs would decrease while educator efficiency would increase. One educational stakeholder proposed an alternative type of professional development (PD). Long (2018) renamed PD as personal development. Instead of conducting a macro-type PD, where hundreds of educators sat in a conference room, Long described the alternative concept of micro-credentials in which educators designed their own PDs based on their personal need for growth in specific subjects (Long, 2018). Instead, use of personal development would give educators more choices, such as participating in available webinars on technology. Use of personal development would eliminate expensive PD days.

Planning. Should the funding issue be resolved, educators would be able to integrate technology into their intervention strategies more efficiently. If electronic devices were reserved specifically for students with HFA, educators would not need to generate two separate lesson

plans. They would have more time to explore the software programs they planned to implement, ultimately making them more knowledgeable and effective when delivering intervention strategies to their students with HFA.

Intervention strategies are usually provided for students with HFA in a small group setting. However, to effectively deliver quality instructions in a small group, educators must develop a plan. Saadatzi, Pennington, Welch, and Graham (2018) agreed that despite the potential benefits, small group instruction often required more time to prepare and was more difficult to implement than a 1:1 arrangement. The researchers reasoned that working with students 1:1 is highly effective and required less planning, because it mimicked a study or tutoring session. When educators planned for a small group, they incorporated the needs of their students with HFA.

Recent seminal research included modules for technology implementation in other school districts and, by analyzing the successful practices, administrators, educators, and stakeholders would be able to reform current technological processes. The school district in which this study was conducted would have to adopt the same protocol regarding technology implemented by the River Dell Regional School District in NJ. Students with HFA had positive experiences and increased their knowledge retention, student engagement, collaboration abilities, and educational equity. Educators could also plan more productively for their students with HFA.

The NJ school district uses OneNote Class Notebook and has had great success. Teich (2018) states:

> Through another of the OneNote learning tools suite, they (educators) can personalize instruction for struggling readers with an immersive reader. Writing is also easier for students, as the new tools allow students to voice to text. Math equations in Windows 10

> are easier, as students can use their stylus with the notebooks. Solving math homework is now less of a struggle for students. The Microsoft streaming tool has also been helpful, as videos are automatically shared through OneNote or Microsoft Stream. This tool also keeps file sizes down. Teachers embed the assessment in the file with the video. (p. 40)

Therefore, educators using OneNote could help address all the accommodations for their students with HFA, such as the struggle in reading, writing, and completion of timely assignments and educators would integrate OneNote into evidence-based practices such as SC, VS, VM, RIR, self-management, and TA. General and special educators using the OneNote program would be more effective and efficient if they could plan with intent using reliable technology. The NJ district has a 1:1 technology ratio and each student uses their own device. If the educators who participated in my study had a one to one ratio technology, they would be able to create longer term lesson plans and more efficacious instructional intervention strategies for their students with HFA.

Other school districts have examined practices for students with HFA. Not all recommended or mandated software programs improved student achievement. Stakeholders of the Verona Area School District in Wisconsin advocated for collaborative and integrative technology and educators in the curriculum department. The program was successful because the two departments collaborated with each other (Raths, 2015). The technology department assisted the educators by evaluating the use of programs not in use, not used correctly, and not effectual in terms of delivering data-driven results. The technology department staff met with the educators in the curriculum department and made sensible changes together. They made certain that the technology was relevant to the current curriculum (Raths, 2018). Therefore, the

educators would not have to verify that the curriculum, devices, and software were conjoined accurately.

The school district in which my study was conducted should consider mirroring the Verona Area School District program process in order to alleviate time constraints for educators who feel obligated to create multiple lesson plans that include and exclude technology. Educators also had to ensure that the curriculum, programs, and technology coalesced seamlessly in order to deliver interventions for their students with HFA. However, the process was time-consuming.

Discussion of Results in Relation to the Literature

The available studies I reviewed were interesting, important, and contributed to the development of my conceptual framework. The researchers were careful, deliberate, and produced valuable information regarding persuasive technology use during techniques used to increase ToM and equalize education. This study expanded on previous researchers' results by interviewing participants who worked with students with HFA using technology within intervention strategies.

Seminal research proved that previous and ongoing research is conducted in academia where educators use technology for students with HFA.

> To successfully integrate technology into any educational program, practitioners need awareness of available technology, an understanding of how it can assist with instruction, knowledge of ways it can support day-to-day activities and, finally, the ability to teach students as well as educators to use the technology. (Ayres, Mechling, & Sansosti, 2013, p. 259)

This profound statement was a basis for my study, specifically for students with HFA. Instead of investigating the issue quantitatively—whether test scores increased after technology

integration in intervention strategies for students with HFA—I decided to pursue a multiple perspective approach by interviewing educational professionals to obtain their professional and personal opinions regarding their experiences for three different theories.

Recent studies and the association. Laurie et al. (2018) recently conducted a study that evaluated the use of technology for students with ASDs, such as HFA. They discussed the benefits and disadvantages of incorporating technology within instructional practices that included intervention strategies. To create evidence-based guidelines for policy and practice on the use of technology in special education, it is important to understand what technologies are available, used and preferred by the community. The community includes autistic users of technology, as well as those supporting autistic users such as practitioners and teachers. (Laurie et al., 2018, p. 39)

My study is directly correlated with this statement because I interviewed educators in the academic community that have had direct experience and worked closely with students with HFA and integrated technology within evidence-based instructional intervention practices. Laurie et al. (2018) concluded "that devices such as tablets, computers and whiteboards are widely used in autism education, while more recently developed devices such as robotics and tangibles are rarer" (p. 42). The researchers evaluated technology and electronic devices that are more readily available in a public school system.

Most peer-reviewed seminal literature consisted of studies that utilized the rare tangibles VR, CLVE, VE, IVE, SVE, and robotics that Laurie et al. (2018) discussed. However, I felt that these rare tangibles were related to the overall use of technology in the educational endeavor of students with HFA. Exploration of all types of technology use, including more widely available apps, was a critical step to the development of my study. Educators were provided the

opportunity to discuss their professional opinions regarding the use of technology within intervention strategies for students with HFA in real time.

Community. In relation to the community, the confounding issue with tracking studies and culminated in the researchers stating, "this has resulted in a field with a weak evidence base where many of the best quality researched technologies are not affordable, or not available to the people they were designed for" (Laurie et al., 2018, p. 39). Thus, high dollar technologies and software were unavailable to educational communities that could not afford them. Rural schools were especially impacted, where internet service may not even be accessible or reliable (Litvinov, 2018).

While current technology developers, software developers, and companies have positive intentions to create assistive technology for students and individuals with autism and HFA, the 3-D programs are most likely unattainable for public school forums. However, some components are feasible in the public school system, such as the use of avatars in certain software programs. Therefore, using the evidence collected from these studies may assist administrators in allocating funding for practical technological programs for students with HFA.

My goal was to address the use of evidence-based research practices specifically for integration of technologies for students with HFA within the public school system. Therefore, I collected information from respected professional educators in the public school forum, who worked with students with HFA every day, year after year. I then organized the gathered information into a report that separated the data into themes.

Accordingly, administrators may choose to use the collected evidence as information when deciding the allocation of funding for technology use within their school.

> For so long many local citizens and the press have been able to ignore the crisis of underfunding in our schools, because educators do so much work to make up for what the district isn't providing, but things are changing. Awareness is growing. (Litvinov, 2018, p. 36)

I believe that my study will bring awareness to the forefront by informing the community that there is a definitive problem within our school system when serving students with HFA, including those with and without IEPs.

Limitations

Although there are limitations and perhaps unforeseen results within any study, the limitations do not diminish the worth and value of the results. In this study, there were a few limitations when conducting the research. In Chapter 3, I listed time constraint and sample size as possible limitations. I also discovered that the school sites became limitations because I had chosen only two different schools.

Sample size. In a qualitative study, a small sample size is deliberately used. The researchers will then be able to intimately describe narratives and contributions from the participants in detail. The researchers are not aiming to find a generalization, but rather a very specific personal story or experience that reflects the truth of the phenomenon being studied (Vagle, 2018).

In my study, I conducted interviews with 19 participants. This number of participants provided me with enough information to recognize data saturation, where no new information was discovered (Fusch & Ness, 2015). In fact, the participants continued to attest to the same points and maintained similar values regarding the phenomenon.

Thus, if I were to repeat this study, I would choose a few more educators without regard to demographics. Thus, I would still be able to prove that the phenomenon exists within the school system. Furthermore, my interviews would be conducted with educators from other schools within the same county and I would verify that the phenomenon is present regardless of the specific school within the same public school system.

Time constraint. Another limitation was time constraint. Initially, I believed that the length of time in which I completed this study might be a limitation. However, I discovered that because my participants had such a diverse background in education, exposure to working with students that had HFA, and years of experience within public education, time was not an impactful limitation factor. My study was based upon the experiences educators had already had while employing technology within intervention strategies for students with HFA.

Repeating the study. In order to decrease the effects of time constraint as a limitation, for a future replication of this study, I might adjust its objectives by using present-day experiences in real time to verify that the phenomenon continues to exist within the current education system. I would choose educators who work directly with students in the current school year, collect data, and publish results quickly. The new study would be an extension of the present study. I would gather information to continue building and maintaining a viable argument that the phenomenon remains ever-present in the public school system.

Location of school sites. The school sites included in this study were vastly different. One school was in an urban area with increased student turnover and a large special education population. The technology was not completely current, which resulted in a decrease in educational equity for students with HFA. The other school was in a more rural area without as much development. The technology was outdated and unequally distributed. Some educators had

more computers than others, which resulted in diminished equalized access to the full curriculum for students with HFA. The location of the school determined the type of reliable internet service which impacted educators as well as students. Teachers and students felt impaired when technology was outdated, unavailable, scarce, or unreliable.

Rural. Unfortunately, the situation in my study reflected diminished equalized available technology among the public schools. Students and educators living in a technologically connected society were progressively hindered when they did not personally possess certain electronic devices, reliable internet service, or access to updated technology. The situation often occurred in rural schools.

The scale of the challenges facing rural school districts is staggering. Some of these issues involve concentrated poverty, inadequate access to health care services, early childhood education and after- school programs, ballooning class size, high transportation costs, teacher shortages, and lack of broadband access (Walker, 2017, p. 45-46). Educators from one of the schools in this study agreed that the internet service was unreliable due to the location of the school site.

Implications of the Results for Practice, Policy, and Theory

If educational stakeholders use the results from this study, perhaps there can be a cultural change within the public school system. Generally, the administration decides how to allocate funds for items and services required within their school. Many administrators have been distanced from the classroom and some have not been educators for students, especially those with HFA.

By reading this study, administrators may be able to make different choices when disseminating funds for technology. Using the educators' feedback from this study could signify

that the administration is listening to the needs of their staff. The general and special educators have worked closely with students with HFA. These educators are immersed within the ever-changing curriculum, instructional methods, and evidence-based intervention strategies that are available today.

Implications of the results for practice. The information contained in this study should be helpful for all educators to assist them in modifying future practices. By understanding how technology is experienced by students with HFA, educators can begin to plan more effectively. The testimonies of the participants indicate that they felt there were distinctive benefits to incorporating technology within their instructional intervention practices. Educators can assume that with technology integration there will be more student engagement.

Educators are continuously increasing their knowledge of new and changing practices through personal reflection and PD. Use of technology within intervention strategies for their students with HFA is important for a consistent and predictable environment. Educators can use the electronic platforms in a variety of ways to achieve successful results, such as increased interest and diminished behavior problems. Students with HFA can complete assignments electronically instead of using paper. Student choice is good practice for increasing student success.

Implications for the results for policy. If administrators of school buildings read this study, they can change their policy at the lowest level. Since they are the leaders of the building, they can set aside funding specifically for technology upgrades for students with HFA. I believe this is especially important given how the brain functions in a person with HFA. There are actual physiological changes that cause the particular response in individuals with HFA (Pitskel et al., 2011). Given certain uncomfortable external stimuli, a person with HFA will blink more rapidly,

avert eye gaze, begin stemming movements, and experience pupil dilation (Lahiri et al., 2015). Consequently, individuals with HFA find electronic and digital environments less stressful (Lahiri et al., 2015).

Therefore, administrators can change their school site policy to reserve certain electronic devices for enrolled students with HFA. The principal, assistant principal, and special education coordinator can create a schedule for students with HFA to use the electronic devices. By providing a set routine schedule, students will be more responsive when the environment is predictable. Educators who set a daily routine may find that there is an increase in student participation and engagement while decreasing certain behavior issues associated with students who have HFA.

Implications of the results for theory. Since students with HFA enjoy using technology due to predictability factors (Sabella & Hart, 2014), student engagement should increase when incorporating technology daily within intervention strategies for students with HFA. The conceptual framework of this study consists of persuasive technology, theory of mind, and educational equity. Educators can use continued purposeful use of electronic devices embedded within curriculum and instructional practices to assist in reaching their students with HFA (McCleery, 2015). Correspondingly, students with HFA are varied in their skillset, behaviors, likes, and dislikes, and technology can be used as a common ground for educators to build skillsets.

Educators can learn how to integrate electronic devices and digital platforms for use as persuasive technology to increase change behavior. This behavior includes motivation for learning, knowledge and skill retention, engagement, and overall enjoyment. The electronic devices are a necessary part of persuasive technology for these students. In theory, the educator

will be more effective and efficient when delivering strategies to students with HFA (Donaldson & Zager, 2010).

With the use of persuasive technology and theory of mind, educational equity should increase. Students with HFA can collaborate comfortably with their peers through the alternative option to use electronic platforms. They can learn how to compromise and voice their opinions and changes without the anxiety and stress of having to face their non-disabled peers. Student use of assistive technology equalizes access to the full curriculum and thus should increase educational equity (Sabella & Hart, 2014).

Suggestions for future funding. The educators were adamant that there was not enough funding for technology, which negatively impacted their students with HFA. They also indicated that there was an absence of meaningful professional development in the area of technology specifically regarding integration of technology and technological aids within evidence-based practices for their students with HFA. Funding and professional development are two areas where the school budget should be appropriated for technology upgrades with training. As a result, educators will be more proficient and effective when delivering instructional intervention strategies for their students with HFA.

Another chief complaint from educators was that they had to plan separately for the possible absence of available devices. Yet, with more devices available in the building, the planning issue may significantly decrease for educators. Moreover, the administration, leadership team, grade level chair, and special education chair can devise a master schedule to ensure that students with HFA will always receive some technology or technological aid within the evidence-based practices in their accommodations or differentiated instructional groups.

Recommendations for Further Research

I believe that my study can be replicated with fidelity. The process would include altering the target sample population and school sites, as well as the public school system, in differing states. There are many avenues to explore with this study to extend researchers' understanding of how impactful these factors are upon the existing phenomenon.

Future researchers may consider altering the target sample to include only special educators with a specific amount of years serving a minimum number of students with HFA. The target sample population may also have strict demographic requirements, such as age, sex, race, and educational degree. Requiring specific demographics would aid researchers in identifying that the phenomenon is non-dependent upon the above elements and exists regardless of demographic requirements for the participants.

Researchers may find that the actual school sites could prove that that the phenomenon does not exist depending upon the area in which the schools are located. In schools with a strong parent-teacher association (PTA) or family and staff organization (FSO), these organizations often provide funding for needed supplies, including updated technology, within the school building. Instead, researchers should delimit schools that rely solely upon government funding to ensure accurate results when concluding whether the phenomenon exists across public schools.

The assumption is that because the federal government provides funding for public school education, the state should not signify in determining whether the phenomenon exists. However, researchers might hypothesize that urban city schools will be at higher risk for diminished funds or the schools' funds would be allocated for needs other than technology. Additionally, some states have a higher per capita per student for public school education. Thus,

if a replication of this study is conducted in a different state, the researchers may want to consider choosing high-risk schools to determine if the phenomenon exists.

Future researchers may want to include non-participant observation. It would be interesting to observe educators delivering the instructional interventions first-hand, including the technology implemented during evidence-based strategies. Researchers using field observation notes would be able to produce triangulation and validation of the results from the study. In addition, technology researchers would be able to witness the use of technology, its omittance, how students with HFA respond to technology, how they handle change if the technology is unavailable or not working, and the end of the intervention when technology is removed.

Conclusion

This study was conducted to explore how educators experienced the use of technology and technological aids integrated within interventions for their students with HFA. There was a phenomenon that existed within a specific public school system in two particular schools; educators attested there was a shortage of technology, including electronic devices, software programs, and even internet services, to have reliably incorporated technology within intervention services for students with HFA. Educators substantiated that they believed this was due to inadequate funding.

Educators were excited to share their stories, narratives, and opinions regarding the use of technology within the field of public education. Since the students spend approximately six to seven hours of their day in school, I wanted an accurate analysis of how technology was implemented within a classroom setting.

I purposely designed the study to produce accurate accounts of how professionals in the

field used technology during evidence-based intervention strategies for students with HFA. Educators articulated their opinions, personal accounts, and experiences when they used, planned, and integrated technology during their instructional intervention time with their students. Since the educators worked closely with the students, they were the key people that should have been involved in the schools' budget plans due to their extensive knowledge of what occurred in the actual classroom.

Educators stated that they felt unheard at times and were forced to use instructional methods that did not work for their students, classroom, or schedules. They would have liked to be directly involved in the school's budget and participate in deciding how the funds were allocated within their school. Administrators are not in the classroom in the same capacity as general and special educators; thus, the educators know what instruments, supplies, electronic devices, and software they need in order to be as successful as possible.

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Appendix A: Interview Protocol

Interview Protocol *Do one page for each research question.
Interview Protocol Title: Educators' Viewpoints on the use of technology integration within intervention for students with autism and autism spectrum disorders.

Date:_____Time:_____Location:_____
Interviewer:_____
Interviewee(s): _____

Opening statement/brief description of project: This study will serve to provide information to the researcher regarding the experiences that educators have while utilizing the available technology to students with autism or autism spectrum disorder. This study will be used as a possible baseline for future technology developers, building administrators, or other educators.

Includes: Investigator motive; purpose of study; protection of respondents, including confidentiality, willingness to continue participation, use of data, access to final report, and permission to record interview.

A. Grand tour question: How do general and special educators describe their experiences using technology during interventions for students with HFA?

B. Sub-questions:
    1. How do you view integration of technology within intervention strategies for students with HFA?

    2. How do you describe your stance on technological interventions and educational access for students with HFA?

    3. How do you describe successes with use of technology for students that have HFA? Why do you think it was successful?

    4. How do you describe some ways that the use of technology may not have been optimal in implementing intervention strategies to students HFA, and why do you think that?

Interview Protocol *Do one page for each research question.
Interview Protocol Title: Educators' Viewpoints on the use of technology integration within intervention for students with autism and autism spectrum disorders.

Date:_____ Time:_____ Location:_____
Interviewer:_____
Interviewee(s): _____

Opening statement/brief description of project: This study will serve to provide information to the researcher regarding the experiences that educators have while utilizing the available technology to students with autism or autism spectrum disorder. This study will be used as a possible baseline for future technology developers, building administrators, or other educators.

Includes: Investigator motive; purpose of study; protection of respondents, including confidentiality, willingness to continue participation, use of data, access to final report, and permission to record interview.

A. Grand tour question: What factors are IEP team committee members considering when they decide to include or refrain from adding technology accommodations within an IEP for students with HFA?

B. Sub-questions:
    1. What would prohibit you from using some technology in interventions for students with HFA?

    2. Do you believe it impacts your instructional delivery in interventions for students with HFA?

    3. Do you think it impacts your ability to plan in interventions for students with HFA?

    4. What might you change for inclusion or omission of technology in interventions for students with HFA?

Appendix B: Consent

READ:

The purpose of this study is to examine the experiences of the educators that use the available technology or choose to omit the technology, as supplementary aids while delivering intervention strategies to students with HFA. I aim to bring awareness to the academic community that students with autism, autism spectrum disorders, and special needs are underserved. This study is important because there is a distinctive paradigm shift in the platform of education, specifically including electronic formats of distance education and integrated technology within the curriculum. Students with HFA often experience a decrease in educational equity, when their educational needs are not met. Understanding how educators utilize and experience technology incorporated within intervention strategies will provide vital information for future researchers when developing technological aids, and also increase educational equity.

The information resulting from this study will be utilized for qualitative research purposes only. It is not ideologically based and conclusions from the study will not bring financial gain to any participants, the researcher, school system, or university. The data gathered may be used by the academic community to gain a better understanding of an existing humanistic issue and how to best resolve it.

The confidentiality of the participants will be honored and names will not be released if requested. There will be no slander, defamation, judgement, or prejudice against any participants, their thoughts, ideas, opinions, educational background, service record, employment status, families, students, or any facet of personal and professional life. The study intends to view these participants as dedicated public servants that aim to educate and empower people with disabilities, specifically students with autism and autism spectrum disorders. The study does not intend, and will not defame the researched public-school system as whole or specific components.

The participant may choose to decline to be interviewed at any time, or may request the withdrawal of their interview data, even after the interview has occurred. The participant reserves the right to clarify any statements and provide explanation for answers if misconstrued by the interviewer.

The participant will have full access to the entire data collection tool, containing any and all information provided by the participant or regarding the actions of the participant through non-participant observation by the researcher. This will ensure valid and accurate data and produce reliability of data by member checking.

Finally, the participant will agree to be voice recorded for the sole purpose of recounting accurate details regarding their professional and personal experiences when using technology or omitting assistive technology during administration of intervention services to students with autism and autism spectrum disorders. The recordings will not be published in any format including but not limited to all forms of social media. Their recordings will remain in the possession of the interviewer only and will not be released or played for any other individual except for the interviewer and participant.

Research Study Title: Integration of Technology within Intervention Strategies for Students with High Functioning Autism: A Phenomenological Approach to Analyzing Educators' Viewpoints
Principal Investigator: Kathy Dempster **Research Institution:** Concordia University **Faculty Advisor:** Chad Becker

Purpose and what you will be doing:
The purpose of this survey is to investigate how educators experience the integration of technology in intervention strategies for students with high functioning autism or HFA. The study will also address the minimally available technology for use in the intervention services. We expect approximately 18-20 volunteers. No one will be paid to be in the study. We will begin enrollment on_____and end enrollment on_____. To be in the study, you will describe and articulate your detailed experiences of utilizing the available technology while administering interventions to students with autism and autism spectrum disorders. I will conduct two separate interviews and one session of nonparticipant observation while you administer interventions to students with autism and autism spectrum disorders. Doing these things should take less than 3 hours of your time.

Risks:
There are no risks to participating in this study other than providing your information. However, we will protect your information. Any personal information you provide will be coded so it cannot be linked to you. Any name or identifying information you give will be kept secure via electronic encryption or locked inside a filing cabinet. When I look at the evidence, none of the data will have your name or identifying information. We will only use a secret code to analyze the data. We will not identify you in any publication or report. Your information will be kept private at all times and then all study documents will be destroyed 3 years after we conclude this study.

Benefits:
Information you provide will help other educators, researchers, stakeholders, and academic members of the community to better understand how educators utilize the available technology to administer intervention services to students with autism and autism spectrum disorders. Your participation in this study may be beneficial to the academic community by providing information that elicits a positive change for the methods that are employed to administer interventions to students with autism and autism spectrum disorders.

Confidentiality:
This information will not be distributed to any other agency and will be kept private and confidential. The only exception to this is if you report abuse or neglect that makes me seriously concerned for your immediate health and safety.

Right to Withdraw:
Your participation is greatly appreciated, but I acknowledge that the questions I am asking are personal in nature. You are free at any point to choose not to engage with or withdraw from the study. You may skip any questions you do not wish to answer. This study is not required and there is no penalty for not participating. If at any time you experience a negative emotion from answering the questions, I will stop asking you questions.

Contact Information:
You will receive a copy of this consent form. If you have questions you can talk to or write the principal investigator, Kathy Dempster at email [redacted]. If you want to talk with a participant advocate other than the investigator, you can write or call the director of our institutional review board, Dr. OraLee Branch (email obranch@cu-portland.edu or call 503- 493-6390).

Your Statement of Consent:
I have read the above information. I asked questions if I had them, and my questions were answered. I volunteer my consent for this study.

_____ _____
Participant Name Date

_____ _____
Participant Signature Date

_____ _____
Investigator Name Date

_____ _____
Investigator Signature Date

Investigator: Kathy Dempster email: [redacted]
c/o: Professor Chad Becker
Concordia University–Portland
2811 NE Holman Street
Portland, Oregon 97221

Appendix C: Statement of Original Work

The Concordia University Doctorate of Education Program is a collaborative community of scholar-practitioners, who seek to transform society by pursuing ethically-informed, rigorously-researched, inquiry-based projects that benefit professional, institutional, and local educational contexts. Each member of the community affirms throughout their program of study, adherence to the principles and standards outlined in the Concordia University Academic Integrity Policy. This policy states the following:

> **Statement of academic integrity.**
>
> As a member of the Concordia University community, I will neither engage in fraudulent or unauthorized behaviors in the presentation and completion of my work, nor will I provide unauthorized assistance to others.
>
> **Explanations:**
>
> ***What does "fraudulent" mean?***
>
> "Fraudulent" work is any material submitted for evaluation that is falsely or improperly presented as one's own. This includes, but is not limited to texts, graphics and other multi-media files appropriated from any source, including another individual, that are intentionally presented as all or part of a candidate's final work without full and complete documentation.
>
> ***What is "unauthorized" assistance?***
>
> "Unauthorized assistance" refers to any support candidates solicit in the completion of their work, that has not been either explicitly specified as appropriate by the instructor, or any assistance that is understood in the class context as inappropriate. This can include, but is not limited to:
>
> - Use of unauthorized notes or another's work during an online test
> - Use of unauthorized notes or personal assistance in an online exam setting
> - Inappropriate collaboration in preparation and/or completion of a project
> - Unauthorized solicitation of professional resources for the completion of the work.

Statement of Original Work (continued)

I attest that:

1. I have read, understood, and complied with all aspects of the Concordia University–Portland Academic Integrity Policy during the development and writing of this dissertation.

2. Where information and/or materials from outside sources has been used in the production of this dissertation, all information and/or materials from outside sources has been properly referenced and all permissions required for use of the information and/or materials have been obtained, in accordance with research standards outlined in the *Publication Manual of The American Psychological Association.*

Kathy Ann Dempster

Digital Signature

Kathy Ann Dempster

Name (Typed)

August 13, 2019

Date